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SPECIFICATIONS

FOR THE ERECTION
AND COMPLETION OF

A TEN-ROOM SCHOOL BUILDING

FOR THE DEPARTMENT OF THE INTERIOR
WASHINGTON, D. C.

TO BE ERECTED UPON SCHOOL RESERVE, BLOCK No. 26
OF THE NORTH ADDITION TO THE TOWN SITE OF

LAWTON, OKLA.

ALL TO BE DONE ACCORDING TO THE FOLLOWING SPECIFICATIONS
AND THE ACCOMPANYING DRAWINGS PREPARED FOR THE SAME BY

ERSKINE M. SUNDERLAND

ARCHITECT AND ENGINEER

403 Ouray Building, corner Eighth and G streets NW.
Washington, D. C.

Approved:

FRANK PIERCE

First Assistant Secretary of the Interior

DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
July 15, 1910



WASHINGTON
GOVERNMENT PRINTING OFFICE

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a. J. S. Dec. 27, 1910, T. C.

PROPOSAL FOR THE ERECTION AND COMPLETION OF A TEN-ROOM SCHOOL BUILDING
FOR THE DEPARTMENT OF THE INTERIOR, WASHINGTON, D. C., TO BE ERECTED
AT LAWTON, OKLA.

[In accordance with the plans and specifications prepared for the same by Erskine M. Sunderland, architect and engineer, 403 Ouray Building, Washington, D. C.]

The SECRETARY OF THE INTERIOR,

Washington, D. C.

SIR: hereby propose to furnish all the labor and materials required for the erection and completion of a school building, to be erected upon School Reserve, block No. 26, of the north addition to the town site of Lawton, Okla., in strict accordance with the plans and specifications prepared for the same by Mr. Erskine M. Sunderland, architect and engineer, for the sum of (\$.....) and complete same on or before day of, 1911.

I. Amount to be deducted if red slate is used in lieu of Spanish tile, as provided for by Alternate No. 1:

..... \$.....

II. Amount to be deducted if Bangor slate is used in lieu of Spanish tile, as provided for by Alternate No. 2:

..... \$.....

III. Amount to be deducted if all electric wiring, distribution board, and panel boards are omitted:

..... \$.....

IV. Amount to be deducted if hot-water heater and hot-water service is omitted:

..... \$.....

Amount included for excavating..... \$.....

Amount included for concrete footings..... \$.....

Amount included for brickwork..... \$.....

Amount included for waterproofing..... \$.....

Amount included for structural steel..... \$.....

Amount included for cut stone..... \$.....

Amount included for sheet-metal work..... \$.....

Amount included for roofing..... \$.....

Amount included for plumbing..... \$.....

Amount included for heating..... \$.....

Amount included for electrical work..... \$.....

Amount included for carpenter work..... \$.....

Amount included for lumber..... \$.....

Amount included for plastering..... \$.....

Amount included for millwork.....	\$.....
Amount included for painting.....	\$.....
Amount included for glass.....	\$.....
Amount included for finishing hardware.....	\$.....
Amount included for sidewalks.....	\$.....
Amount included for grading.....	\$.....

UNIT PRICES FOR MATERIALS IN PLACE.

1. Excavating per cubic yard.....	\$.....
2. Portland cement per barrel.....	\$.....
3. Broken stone per cubic yard.....	\$.....
4. Gravel per cubic yard.....	\$.....
5. Sand per cubic yard.....	\$.....
6. Concrete footing per cubic yard.....	\$.....
7. Common brick per M.....	\$.....
8. Face brick per M.....	\$.....
9. Waterproofing per square foot.....	\$.....
10. Cut stone per cubic foot.....	\$.....
11. Steel beams per pound.....	\$.....
12. Tile roofing per square.....	\$.....
13. Red slate roofing per square.....	\$.....
14. Bangor slate roofing per square.....	\$.....
15. Concrete floor slabs per square foot.....	\$.....
16. Cinder fill per square foot.....	\$.....
17. 4-inch cast-iron pipe per lineal foot.....	\$.....
18. 5-inch cast-iron pipe per lineal foot.....	\$.....
19. 6-inch cast-iron pipe per lineal foot.....	\$.....
20. Closets M1860.....	\$.....
21. Closets M1625.....	\$.....
22. Drinking fountains.....	\$.....
23. Ceiling joists per M feet.....	\$.....
24. Roof rafters per M feet.....	\$.....
25. Roof sheathing per M feet.....	\$.....
26. Flooring per M feet.....	\$.....
27. Plastering per square yard.....	\$.....

28. Sidewalks per square foot..... \$.....
29. Grading per square yard..... \$.....

Certified check No.....on.....for the sum of.....
..... (\$.....) herewith inclosed.

Signature.....

Address.....

.....

Names of individual members of firm {
.....
.....
.....

Name of corporation.....

Name of president.....

Name of secretary.....

Under what law corporation is organized.....

.....

PROPOSAL FOR THE ERECTION AND COMPLETION OF A TEN-ROOM SCHOOL BUILDING FOR THE DEPARTMENT OF THE INTERIOR, WASHINGTON, D. C., TO BE ERECTED AT LAWTON, OKLA.

[In accordance with the plans and specifications prepared for the same by Erskine M. Sunderland, architect and engineer, 403 Ouray Building, Washington, D. C.]

The SECRETARY OF THE INTERIOR,

Washington, D. C.

SIR: hereby propose to furnish all the labor and materials required for the erection and completion of a school building, to be erected upon School Reserve, block No. 26, of the north addition to the town site of Lawton, Okla., in strict accordance with the plans and specifications prepared for the same by Mr. Erskine M. Sunderland, architect and engineer, for the sum of (\$.....) and complete same on or before day of, 1911.

I. Amount to be deducted if red slate is used in lieu of Spanish tile, as provided for by Alternate No. 1:

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II. Amount to be deducted if Bangor slate is used in lieu of Spanish tile, as provided for by Alternate No. 2:

..... \$.....

III. Amount to be deducted if all electric wiring, distribution board, and panel boards are omitted:

..... \$.....

IV. Amount to be deducted if hot-water heater and hot-water service is omitted:

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Amount included for excavating..... \$.....

Amount included for concrete footings..... \$.....

Amount included for brickwork..... \$.....

Amount included for waterproofing..... \$.....

Amount included for structural steel..... \$.....

Amount included for cut stone..... \$.....

Amount included for sheet-metal work..... \$.....

Amount included for roofing..... \$.....

Amount included for plumbing..... \$.....

Amount included for heating..... \$.....

Amount included for electrical work..... \$.....

Amount included for carpenter work..... \$.....

Amount included for lumber..... \$.....

Amount included for plastering..... \$.....

Amount included for millwork.....	\$.....
Amount included for painting.....	\$.....
Amount included for glass.....	\$.....
Amount included for finishing hardware.....	\$.....
Amount included for sidewalks.....	\$.....
Amount included for grading.....	\$.....

UNIT PRICES FOR MATERIALS IN PLACE.

1. Excavating per cubic yard.....	\$.....
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3. Broken stone per cubic yard.....	\$.....
4. Gravel per cubic yard.....	\$.....
5. Sand per cubic yard.....	\$.....
6. Concrete footing per cubic yard.....	\$.....
7. Common brick per M.....	\$.....
8. Face brick per M.....	\$.....
9. Waterproofing per square foot.....	\$.....
10. Cut stone per cubic foot.....	\$.....
11. Steel beams per pound.....	\$.....
12. Tile roofing per square.....	\$.....
13. Red slate roofing per square.....	\$.....
14. Bangor slate roofing per square.....	\$.....
15. Concrete floor slabs per square foot.....	\$.....
16. Cinder fill per square foot.....	\$.....
17. 4-inch cast-iron pipe per lineal foot.....	\$.....
18. 5-inch cast-iron pipe per lineal foot.....	\$.....
19. 6-inch cast-iron pipe per lineal foot.....	\$.....
20. Closets M1860.....	\$.....
21. Closets M1625.....	\$.....
22. Drinking fountains.....	\$.....
23. Ceiling joists per M feet.....	\$.....
24. Roof rafters per M feet.....	\$.....
25. Roof sheathing per M feet.....	\$.....
26. Flooring per M feet.....	\$.....
27. Plastering per square yard.....	\$.....

28. Sidewalks per square foot..... \$.....

29. Grading per square yard..... \$.....

Certified check No.....on.....for the sum of.....
 (\$.....) herewith inclosed.

Signature.....

Address.....

Names of individual members of firm {

Name of corporation.....

Name of president.....

Name of secretary.....

Under what law corporation is organized.....

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GUARANTY.

[NOTE.—If preferred, a certified check may be submitted with bid in lieu of this guaranty. See page 7 of specifications.]

We,
.....
for value received, hereby guarantee and bind ourselves and each of us, our and each of our heirs, executors, administrators, and assigns, in the event that a contract for the erection and completion of a ten-room school building at Lawton, Okla., according to the advertisement and specifications of
shall be awarded to
.....,
that he, the said
will, within the time limited by the specifications, enter into and duly execute, as required by the said specifications, a contract accordingly, and this guaranty is based and governed by the said specifications as to its scope and extent;
and in case of failure of the said
to enter into contract as above, that we will forfeit and pay to the United States the sum of *..... dollars (\$.....);
for which forfeiture we will be jointly and severally liable as fixed and settled damages, and not as a penalty to be reduced or diminished.

Dated at
....., 19...

Guarantors' signatures { Name
P. O. Address
Name
P. O. Address

CERTIFICATE.

The undersigned,, in the State of....., certifies that he is acquainted with the above guarantors and knows them to be citizens of the United States, men of property, and able to make good their guaranty.

Dated at.....
..... 19...
*.....
(Official character)

* This certificate must be signed by the postmaster, United States judge, United States attorney, United States commissioner, United States collector of internal revenue, or the clerk of a court of record at or nearest the place of residence of the bidder.

ADVERTISEMENT.

DEPARTMENT OF THE INTERIOR,

Washington, D. C., _____, 1910.

Sealed bids (in duplicate) will be received at the department until 2 o'clock p. m., 19—, and then opened in the presence of such persons as may attend, for the erection and completion of a ten-room school building, in the north addition to the town site of Lawton, Okla., in accordance with drawings and specifications to be had on application at this department. All bids must be accompanied by a certified check equal to 5 per cent of the amount of the bid, payable to the Secretary of the Interior. Bidders may accompany their proposals with a guaranty signed by at least two responsible guarantors, that the bidder will, within ten days after being called upon to do so, execute a contract in accordance with the terms of his proposal, and give a bond for the faithful performance thereof. Guaranty will be accepted in lieu of certified check. The right is reserved to reject any or all bids or waive technical defects, to accept one part and reject the other, as the interests of the Government may require. Bidders are invited to attend. Applicants for plans and specifications will be required to submit with their application for same a certified check for \$25 payable to the Secretary of the Interior, as a guaranty that they will return in good condition the plans and specifications. Proposals must be marked "Proposals for school building, in the north addition to the town site of Lawton, Okla."

GENERAL INSTRUCTIONS AND CONDITIONS.

FORM OF PROPOSAL AND SIGNATURE.—Proposals must be made in duplicate on the blank form to be had on application, inclosed in sealed envelope, marked "Proposals for school building, in the north addition to the town site of Lawton, Okla.," and addressed to the Secretary of the Interior, Washington, D. C., stating in writing and figures (without interlineations, alterations, or erasures) the sum of money for which the bidder proposes to supply the materials and perform the work required by the drawings and specifications, and the time within which he proposes to complete the work, and the unit prices and the separate estimates called for in the proposal sheet. The proposal must be signed with the full name and address in full of each member; and if a copartnership, the copartnership name by a member of the firm, with the name and address in full of each member; and if a corporation, by an officer in the corporate name, with the corporate seal attached to such signature. No telegraphic proposal or telegraphic modification of proposal will be considered. If proposal is sent by registered mail, allowance should be made for the additional time required for such transmission.

PROPOSAL GUARANTY.—Each proposal must be accompanied with a guaranty, signed by at least two responsible guarantors, that the bidder shall, within ten days after being called upon to do so, execute a contract in accordance with the terms of his proposal, and give a bond for the faithful performance thereof, with good and sufficient sureties as hereinafter required. The responsibility and sufficiency of the signers of such guaranty to be certified to by the postmaster, United States attorney, United States judge, or the clerk of the court of record at or nearest to the place of residence of the bidder. The guaranty must be in a penal sum of 5 per cent of the amount of the proposal. If preferred, a certified check of like amount, payable to the order of the Secretary of the Interior, may be filed in lieu of guaranty; the amount of said check to be forfeited to the Government in event of failure on the part of the bidder to enter into contract in accordance with the proposal. Checks submitted by bidders will be returned after the approval of the contract and bond executed by the successful bidder.

EIGHT-HOUR LAW.—The attention of bidders is called to the act of Congress approved August 1, 1892, limiting the hours of daily service of laborers and mechanics employed upon public works of the United States to eight hours in one calendar day.

AWARD.—If the bidder to whom the first award be made should fail to enter into a contract as herein provided, then the award may be annulled and the contract let to the next most desirable bidder, in the opinion of the Secre-

tary of the Interior; and such bidder shall be required to fulfill every stipulation embraced herein as if he were the original party to whom the contract was awarded.

None of the contracts can in any case be lawfully transferred or assigned.

PATENT RIGHTS.—The contracts must save, keep, bear harmless, and fully indemnify the United States and any of its officers and agents for all damages or claims for damages, costs, or expenses in law or equity that at any time may arise or be set up for any infringement of the patent rights of any person or persons in consequence of the use by the Department of the Interior, or any of its officers or agents, of articles supplied under this proposal and of which the contractor is not the patentee or assignee or lawfully entitled to sell same.

CONTRACTOR'S BOND.—The contractor will be required to give a bond in the sum of 50 per cent of the amount of the contract, conditioned upon the faithful performance of all the covenants, stipulations, and agreements of the contract on the part of the contractor to be performed as therein set forth. Corporate sureties are preferred to individual sureties. Individual sureties (not less than two) will be required to justify their responsibility by affidavit showing that they severally own and possess property of the clear value in the aggregate of double the amount specified in the bond over and above all debts and liabilities and all property by law exempt from execution. If at any time during the continuance of the contract the sureties, or either of them, shall die or become irresponsible, the Secretary of the Interior shall have the right to require additional and sufficient sureties, which the contractor shall furnish to the satisfaction of the Secretary of the Interior within ten days after notice, and in default thereof the contract may be annulled.

GUARANTY.—Each bidder must distinctly understand that if his proposal is accepted he will be required to execute a formal contract and bond for the faithful performance of his work, that such contract and bond will also be a guaranty for the proper execution of the work, as to character of material and workmanship, and to remedy all defects at his own expense which may develop by reason of the use of any inferior or defective materials or workmanship for a period of one year after the date of final payment and the conditional acceptance of the work at such time.

All questions as to defects necessary to be remedied during such period are to be determined by the Secretary of the Interior or his authorized agent.

SUBCONTRACTORS.—No subcontractor or other person furnishing material or labor to the contractor will be recognized, nor will the Department of the Interior be responsible in any way for the claims of such persons beyond the taking of a bond as required by the act of Congress approved August 13, 1894, as amended by the act approved February 24, 1905, which provided, in substance, that when a formal contract is let for the erection or repair of a public building, etc., the contractor, before commencing such work, shall furnish the usual penal bond, as required by the act of Congress approved August 13, 1894, as amended by the act approved February 24, 1905, with good and sufficient sureties, with the additional obligation that such contractor will make prompt payment to all persons furnishing him labor or materials used in the prosecution of the work. Persons so furnishing labor or materials have a right of action on said bond, in the name of the United States, for their use. No formal contract is usually let, however, and no bond taken where the amount is less than \$2,000.

PARTIES IN INTEREST.—No Member of, or Delegate to, Congress, no officer or agent of the United States, no officer of the Interior Department, superintendent, inspector, clerk, employee, or other persons in any manner connected with the government service shall be interested, either directly or indirectly, in the contract or work herein provided for, or be entitled to any benefit derived therefrom; and any violation of this understanding shall work a forfeiture of all moneys which may become due to the successful bidder.

SCHEDULE OF PRICES.—The contractor shall furnish to the architect a detailed schedule of prices on which their proposal is based before signing the contract, and this schedule shall be the basis of all payments on account of the work done, and for all additional work that may be ordered to be done during the progress of said work.

AUTHORITY OF THE ARCHITECT.—By virtue of the provisions of an existing contract, executed by and between the Secretary of the Interior, acting for and in the behalf of the United States, and Erskine M. Sunderland, as the parties thereto, the said Erskine M. Sunderland is designated as the architect for the school building in the North Lawton Addition, has been made responsible for the preparation of all drawings and specifications for such building, and the proper supervision of the construction of same; and in view of such responsibility is invested with the customary authority of an architect, except as controlled by the regulations of the department.

The said Erskine M. Sunderland, either personally or by duly authorized representative, shall have power and authority to inspect, examine, and approve or reject material, methods, or workmanship furnished or used under this contract, and to direct the progress of the work, and any or all parts of the same, with the exception that all orders involving modifications in the provisions of this contract, or in drawings, letters, or specifications included therein, shall be subject to and have the approval of the Secretary of the Interior.

After the award and signing of the contract all business relating to the work shall be transacted with or through the architect, excepting as herein otherwise provided.

DESIGNATION OF PARTIES.—Where the words “the department” or the “Department of the Interior” are used in this specification it shall be understood that they refer to the Department of the Interior, Washington, D. C., acting for the United States.

Where the words “the contractor” are used it shall be understood to refer to the contractor operating under the specification of which these general conditions are a part, unless particularly noted otherwise. In using the pronoun designating the contractor, the third person, singular, is adopted herein, whether the contract is in the hands of an individual, a firm, or a corporation.

Where the words “the architect” are used they shall refer to Erskine M. Sunderland or his properly authorized representative.

Where the words “the superintendent” are used they shall refer to.....
DRAWINGS.—The architect will furnish all plans, elevations, sections, and details, showing the general design and arrangement of the building; one complete set or parts of set to each of the various contractors.

Shop drawings, extra copies of architect's drawings, and all necessary measurements at the building are to be made by the contractor at his own cost.

The drawings and specifications are the property of the United States and must be preserved and returned to the architect before the final certificate is issued.

The contractor must follow strictly the drawings and specifications as to kind and quality of materials and workmanship. Any apparent errors or omissions or ambiguous parts in drawings or specifications should be at once referred to the architect, and his decision as to the intent and meaning of the drawings and specifications shall be final.

Figured dimensions marked on drawings are to have preference over the scale measurements, and the larger scale, or full-size details, the preference over the smaller scale drawings. In case of any discrepancy between the drawings and specifications the specifications are to govern.

The contractor must verify all measurements given to him by the architect before the work is commenced. Should any error occur, he must immediately refer it to the architect for correction.

Should the contractor consider anything on any full-size detail as beyond the requirements of the contract, he must at once notify the architect. Failure to make such claim within ten days after receipt of any such detail shall constitute an acceptance of same.

The architect in approving working or shop drawings submitted to him by the contractor for approval shall not be held responsible for any constructional changes, omissions, or deviations made by the contractor from the original drawings, unless such changes shall be brought to his notice by written statements and presented with the drawings.

CHANGES.—The architect and department reserve the right to make any alterations in the work during its progress, whether additions or omissions, and the contract shall not be invalidated by such changes, but further time will be allowed for or deducted from the completion of the work, and an addition or deduction is to be made in the payments to the contractor who is to submit estimate for same before proceeding with the work.

EXTRA WORK.—No extra work will be allowed unless ordered in writing by the architect or the department, and bills for same must be rendered immediately upon completion of the extra work, accompanied by the written order or accepted estimate for the same.

In case extra work is of such a nature that an estimate can not be made in advance, then such work is to be done at cost, plus 10 per cent for the contractor. Claims for such work, accompanied by order and vouchers, must be presented when the next payment is due, otherwise all claim for same will be considered abandoned.

DEFECTIVE WORK.—Any work or materials furnished by the contractor which are defective or not fully in accordance with the drawings or specifications in every respect will be rejected and must be immediately removed and replaced in accordance with the drawings and specifications. Any work disturbed in making the changes is to be restored at the expense of the contractor.

The department will have the option to allow defective or improper work to stand and to receive from the contractor a sum of money equivalent to the difference in value of the work as performed and as herein specified.

The contractor is to provide proper facilities for the inspection of the work at all times.

DELAY IN THE WORK.—Should the contractor neglect or refuse to carry on the work in compliance with the drawings and specifications, the department shall have the right, after three days' written notice to the contractor, to provide other labor and materials to complete the work and to deduct the cost thereby occasioned from any amount due the contractor.

The department shall also have the right to terminate the employment of the contractor and to enter upon the premises and take possession for the purpose of completing the work of all materials, tools, and appliances. And the contractor shall not be entitled to receive any further payment for said work until the completion, and then only in case the amounts paid by the department are not in excess of the amounts due the contractor. But if such expenses exceed the amount due the contractor, then the contractor shall pay the department the balance.

Any such delay, neglect, refusal, any damage incurred through such delay or default, shall be certified to by the architect, and bills for other labor and materials shall be audited and certified to by the architect, whose certificate shall be final and binding on both parties.

Should the contractor be delayed in the progress of the work by any act, neglect, or default of the department or other contractor on the work, or by damage caused by fire, earthquake, or cyclone, or other casualty beyond the control of the contractor, or by strikes or lockouts, then the time for the completion of the work shall be extended to a period equal to the time lost, which time shall be determined by the architect, but no such allowance shall be made unless a claim therefor is presented to the architect in writing within forty-eight hours of the occurrence of the delay.

The department agrees to provide all labor and materials necessary for the completion of the work which are not included in this specification and in such manner as not to delay its progress, and in case of failure to do so, thereby causing loss to the contractor, the department agrees to reimburse the contractor for such loss.

Should the contractor delay the progress of the work, thereby causing loss to the department, the contractor agrees to reimburse the department for such loss.

All of which is to be certified to by the architect.

CERTIFICATES.—Payments to the contractor are to be made in installments as the work progresses, as mentioned in the contract, and only upon certificates of the architect that contractor is entitled to such payment.

No certificate issued or payment made, except the final certificate, shall be evidence of the satisfactory performance of the work, and no payment shall be evidence of the acceptance of faulty work or materials or operate as a waiver to any rights the department may hold under this specification.

VOUCHERS.—The contractor must produce, when called upon by the architect or the department, vouchers or affidavits from the subcontractors and material men to show that the work is being paid for, and also the outstanding claims against the building.

RISK.—The building or work is entirely at the risk of the contractor until the same is completed and accepted by the department, and he will be held liable and responsible for its safety to the amount of money paid to him by the department on account of same.

INSURANCE.—The contractor, at his own expense, is to maintain insurance on the work against loss or damage by fire, the policies to cover the interest that both parties may have in all work incorporated in the building and all materials, machinery, tools, fixtures, and apparatus in and about the building.

PROTECTION OF THE WORK.—The contractor is to provide all temporary roofs, coverings to openings during plastering, with doors and sash wherever required, boxing, including trees on grounds, and cover planks or other suitable protection to all work on the building, and any work or material injured by lack of proper protection must be made good by the contractor who originally built it, at the expense of the general contractor.

PROTECTION OF THE PUBLIC.—The contractor is to provide and keep in good repair during the progress of the work all fences, temporary sidewalks, guards, lights, warning signs, etc., and he will be held responsible for any loss or damage or injury that may occur to either persons or property through neglect or carelessness of either himself or his employees. Any adjoining property, streets, or sidewalks injured or destroyed must be repaired and made good at the expense of the contractor.

WATCHMEN.—The contractor is to furnish proper watchmen, both by day and night, to keep the building free from trespassers and to protect it or the public from loss or injury until completion.

COMPLIANCE WITH LAWS.—The contractor is to comply strictly with the building laws and any other rules or regulations relating to buildings, streets, sidewalks, sewers, and water, gas, or electric supplies, fire protection, or public health or safety in force in the city of Lawton, Okla., and he will be held responsible for any violations of same, the drawings and specifications notwithstanding.

PERMITS.—The contractor will obtain and pay for all permits, give all necessary notices, and comply with all requirements in relation thereto.

STABILITY. It is especially understood that the contractor is to carefully study the drawings and specifications to fully understand every detail of the construction, and if at any time he thinks there is any modification necessary or desirable for the stability or economical construction of the building, he is requested to immediately notify the architect and the department of this in writing, and the parts so criticised are not to be executed until the contractor has received written notice, signed by the architect and department, to proceed with the work.

SUBCONTRACTORS.—The names of all subcontractors proposed to be employed on the work are to be submitted to the architect, with the bids, and approved by the said architect before any work is awarded to them.

The general and subcontractors are to cooperate with each other in the work, so that as a whole the work will be a complete and finished one, and avoid hindering each other and delaying the progress of the work, and the general contractor is to see that all electric outlets, register faces, heating and plumbing pipes, etc., are properly centered in the wall or panel spaces in which they occur, as no extras will be allowed for any shifting necessary to properly center these outlets.

All transactions with subcontractors are to be made through the general contractor, excepting explanations and instructions relating to their work, which may be made direct.

All these general conditions apply equally to the subcontractors.

MATERIALS.—All the materials required to erect the work herein described are to be the best of their several kinds, and furnished in ample quantity to prevent delay.

Samples of all materials and finish to be used are to be submitted to the architect for approval whenever asked for, and all materials and workmanship must be equal in every respect to the sample approved.

Tests of any of the work or materials are to be made by the contractor, at his own cost, whenever called for by the architect.

WORKMANSHIP.—The entire work is to be under the direction and superintendence of the architect, and all materials and workmanship must be to his entire satisfaction.

The mechanics of the various trades employed on the work must be skilled workmen, under charge of a competent foreman. Incompetent, careless, or negligent men must be discharged by the contractor when requested by the architect.

The work is to be in charge of a capable and approved general foreman, from the beginning until completion.

CUTTING.—Each subcontractor is required to do all the cutting, patching, and fitting in his line of work necessary for all the other work in connection therewith, and to make good the same when the other work is finished.

PHOTOGRAPHS.—The contractor is to obtain and pay for all such satisfactory photographs as may be necessary to show the general condition and progress of the work, and is to furnish two 8 by 10 inch mounted prints each month; one of each shall be filed in the office of the Secretary of the Interior and the other in the office of the architect. Each negative shall be numbered and dated and shall be taken from such points as will best show the condition of the work, as may be directed by the architect. These photographs shall be taken as conclusive evidence of the progress of the work in case of any dispute arising as to such progress, and it is expressly understood that they are taken for that purpose.

SUPERINTENDENT'S OFFICE.—The contractor is to provide a temporary office, according to plan shown on drawings, from the beginning until completion of work, furnished with a counter, drawers, and rack for drawings, and proper provisions for heating.

A complete set of drawings and specifications, including copies of full-size details, must be always kept in the office.

TELEPHONE.—The contractor is to provide and maintain telephone service from the beginning until the completion of the work, and the architect is to be allowed free use of same.

SPECIFICATIONS.

GENERALLY.—The following general conditions apply to and govern the entire work, and form a portion of this specification:

The contractor is to do all the work necessary to the perfect completion of his contract, rectify any failure resulting from negligence or faulty materials, and maintain secure and firm the whole of his work, including additions and alterations should such be made.

He is to furnish all transportation, labor, materials, apparatus, scaffolding, and utensils needful for performing his work in the best manner, to the satisfaction of the architect, according to the true intent and meaning of these specifications and the drawings which accompany them.

EXCAVATIONS.—All excavating for foundation walls, piers, trenches, etc., to be the depth required by the drawings; all excavating materials to be removed at once from the site unless otherwise ordered by the architect. If the excavated earth from the general excavations proves to be of sufficient quality, same may be used for building terrace, as indicated on plat Drawing No. 1.

CONCRETE.—All concrete except for fireproof floors, girders, columns, and cinder concrete fill, where called for by the drawings, to be made in the following proportion: One part Portland cement, 2 parts clean, sharp sand, and 5

parts clean, crushed stone. All to be mixed to measure as directed and immediately put in place and thoroughly rammed.

The whole is to be mixed on a tight platform, to be turned over at least three times from the shovel, without heaping it up, sufficient water to be used to bring the mortar to such a consistency that when well rammed free water will appear on the surface. A concrete mixer may be used, upon the approval of the architect. All concrete shall be built as shall be directed by the architect, and at such time and place as he shall direct, and to his entire satisfaction.

CONCRETE FLOORS.—Where shown on the drawings, concrete floors are to be constructed as follows: To be composed of one layer, 3 inches thick, of broken stone, properly tamped in place, and covered with a 3-inch thick layer of concrete, concrete to be covered with a 1-inch surface coat composed of 2 parts Portland cement and 3 parts clean, crushed granite or furnace slag, same to be troweled to a smooth, hard surface and divided off into blocks approximately 4 feet square, then to be dusted with cement.

CEMENT.—All cement throughout the entire work to be equal to the Atlas brand Portland cement. Residue on a No. 100 sieve not to exceed 10 per cent, nor more than 30 per cent on No. 200 sieve. Initial set shall be required in not less than forty-five minutes, and final set within ten hours, using Gilmore's weighted wires. Pats of neat cement after thirty days in air and water shall show no signs of crazing, cracking, or distortion. Standard briquettes should develop the following tensile strength for 1 square inch of section:

Neat cement—

After twenty-four hours, 200 pounds.

After seven days, 500 pounds.

After twenty-eight days, 650 pounds.

One part cement to 3 parts sand—

After seven days, 175 pounds.

After twenty-eight days, 250 pounds.

The highest average result made from each set of briquettes made at any one time is to be considered the governing test. Cement shall be put up in strong, sound barrels well lined with paper, or in cloth sacks, labeled with the brand and name of the manufacturer. On each package must be marked in a manner conforming to a written statement from the manufacturer to the architect, stating the date of manufacture, and the quality of cement in each package. This statement to be furnished the architect before any cement is tested.

SAND.—All sand used throughout this work, for either mortar or cement, must be clean, coarse, sharp, and entirely free from particles of dirt, and equal in all respects to samples submitted to and approved by the architect.

BROKEN STONE.—Broken stone used in concrete must be of the best quality bluestone or other stone which, in the opinion of the architect, is of quality equally as good and in every way suitable for the purpose for which it is to be used. It must be sound and durable, free from all dries, shakes, or flaws of any kind whatsoever, and must be of such a character as will, in the opinion of the architect, withstand the action of the earth and water. All broken stone for concrete shall be clean, free from pyrites (sulphate of iron), and broken so as to pass always through a 2-inch ring. No stone of an inferior quality will be accepted or permitted to be delivered on the grounds.

Washed gravel that will meet the same requirements of the stone may be used when samples of same have been submitted to the architect for approval.

BRICKWORK.—All walls and piers (except where otherwise noted on the drawings) shown on the plans and sections by alternate solid and broken line to be of brick. All facing brick for exterior walls to be equal to those manufactured by the Hydraulic-Press Brick Company, St. Louis, Mo., No. 507 of standard size, and must be of uniform color, size, and shape; sound, hard burnt, and firm in texture. These brick to be laid with clip bond, with $\frac{3}{8}$ -inch joint of white mortar. All other brickwork for brick backing, piers, interior walls, etc., to be the best quality common brick, using arch brick from top of footing to the underside of first floor. Balance of brickwork not heretofore specifically specified to be of red brick; all brick to be of the best quality, sound and hard, firm in texture, no soft or salmon brick to be allowed. All to be laid in a first-class manner in cement mortar, bonded thoroughly with header every fifth course, laid close and solid; the joints of each course to be flushed full of mortar well worked in with the trowel.

Openings to be formed in walls for the passage of all pipes of whatsoever nature. All walls and piers are to be plumb, true, and square, level to exact height, and to have all necessary openings, flues, chases, recesses, etc., as shown or as directed. Samples of all brick to be submitted to the architect for approval.

RELIEVING ARCHES.—Build brick arches or relieving arches behind lintels, over all openings, of a course of rowlocks for each 12 inches of span, upon wood centers, thoroughly keying up same.

MORTAR FOR MASONRY.—All mortar for brickwork, unless otherwise specified, to be composed of 1 part Portland cement to 4 parts of sand, thoroughly mixed dry, and then water added in proper proportion. For walls

above grade sufficient lime may be added which, in the judgment of the architect, will make the mortar work easily. No retempered cement mortar is to be used.

WATERPROOFING.—Must be composed of three layers of "Hydrex" or equal waterproofing felt, each layer to overlap one-third its width until three thicknesses are obtained. Over the entire under and top surfaces, under and between each layer of felt, also over top of same, spread a uniform coating of hot "Hydrex" compound, "C" grade or its equal.

This must cover the entire basement floors around all pipe sleeves, extending through the walls and carried up the outside of walls in two layers to grade, up back of doorsill, and turned into all walls at slate course. To include ducts, trenches, etc.

(Contractor must give written guaranty for one year.

Cover the entire interior area of exterior brick walls with a thick coat of "Hydrex Preservative Paint" as damp-proof coating.

SLATE COURSE.—Provide and build in $\frac{1}{4}$ -inch slate course at grade line.

CUT STONE.

LIMESTONE.—Where called for by the drawings, ornamental stonework, such as window sills, window keys, belt courses, water tables, etc., to be of the best quality Indiana limestone, free from all imperfections and of even color, equal to sample to be approved by the architect. Finish of all exposed surfaces, except moldings, to be a vertical, machine-tooled finish. Moldings to have horizontal tooling.

GRANITE.—All doorsills to be of the best quality Richmond blue granite, sound, free from seams or other flaws, and equal to samples to be approved by the architect, and to have eight-cut finish.

BLUESTONE.—All area, window, and door sills, and area copings to be of the best quality bluestone, free from imperfections, and of even color, and with rough finish, except as otherwise noted.

MODELED WORK.—The contractor shall also furnish models for all ornamental work and shall employ for this purpose the very best sculptors and modelers. All model work shall be submitted for approval, or photographs submitted if asked for, and no work shall be commenced until such approval shall have been obtained by the contractor.

SETTING.—The contractor must receive, store, and protect the cut-stone work at the site. Each piece of stonework is to be anchored back and all coping doweled together. All limestone and granite is to be set in mortar made with La Farge or equal stainless cement, in proportion and manner as specified for brick mortar, and all plastered on the back with $\frac{1}{2}$ -inch thick coat of same cement. Sills are to be bedded at ends only. Point up under sills after all walls have set, and clean down and point up stonework upon completion of the contract.

STEEL AND IRON WORK.

GENERALLY.—The contractor is to supply and put in place complete all steel and iron work required by the drawings and specifications.

The contractor will not be allowed to execute the steel and iron work by the drawings furnished by the architect, but must make his own shop drawings, copies of which must be sent to the architect for approval, and a correct copy of all these drawings is to be filed with the architect for reference.

Any materials, sheared, punched, or riveted up before the approval of the shop drawings and the acceptance of the material, will be at the contractor's risk.

CAST IRON.—All of the cast iron to be of the best quality, tough, gray iron, sound and clean, sharp and free from defects, cracks, and bubbles, smooth finish and true to the patterns. All holes for bolts and screws to be properly cored and reamed.

EXPANSION BOLTS.—All expansion bolts to be of an approved pattern, and samples of the same to be approved before using same on the work.

QUALITY OF STEEL.—All steel must be either Bessemer or open-hearth medium steel of American manufacture having an ultimate strength in tensile of from 60,000 to 68,000 pounds to the square inch. It must not contain more than 8 per cent of phosphorus or acid nor more than 6 per cent phosphorus for basic open-hearth steel.

The elastic limit not less than one-half the ultimate strength in tension, minimum elongation of 24 per cent in 8 inches, minimum reduction of area at the fracture of 40 per cent to bend cold through 180 degrees equal to the test piece without showing a flaw or crack on the outside of the bent portion.

Any bent material which is $2\frac{1}{4}$ per cent light will be rejected.

Rivet steel to have a tensile strength of from 54,000 to 58,000 pounds to the square inch, and must be capable of being bent cold on itself and flattened without any sign of fracture.

WROUGHT IRON.—All wrought iron must be tough, fibrous, of uniform quality, and of American manufacture. The finished pieces must show perfect welding during rolling and be free from burrs, blisters, and seams.

WORKMANSHIP.—All workmanship to be first class in every respect. All joints and splices, unless otherwise noted on drawings, must be planned so as to give close bearing throughout.

Rivet holes must be laid off and punched so accurately that the holes will come exactly opposite when the members are brought into position for driving rivets. Rivets must completely fill the holes and have full bearing, concentric with rivets, and the heads must have full bearing on plates.

Wherever bolts are used the nuts must be turned tight and the threads upset. All holes in the material $\frac{5}{8}$ inch thick or less may be punched full size, but holes over $\frac{5}{8}$ inch thick must be punched $\frac{3}{4}$ inch small and then be reamed to full size or drilled. The diameter of the punch must not exceed the diameter of the rivet, nor the diameter of the die exceed that of the punch by more than $\frac{1}{16}$ inch.

Drift pins must be used only for bringing pieces together in assembling, and they must not be driven so hard as to distort the metal.

IRON STAIRS.—Contractor is to build iron stairs as shown by the drawings. Stairs to have stringers of sizes shown and all to be according to full-size details to be furnished later.

SHEET METAL WORK.

FLASHING.—All flashings to be of the best quality zinc and of forms indicated by drawings. The cross joints to be single locked, flat seams, thoroughly soldered. Samples of zinc to be submitted to the architect for his approval.

GALVANIZED IRONWORK.—All galvanized ironwork called for by the drawings to be of No. 24 B. & G. galvanized iron. All molded work to be of the design shown, and contractor is to submit to the architect for his approval full-size details for all galvanized ironwork before same is executed. Inlets from gutters to have galvanized iron baskets to prevent rubbish from getting into the conductors.

COPPER.—Where called for by the drawings, copper is to be of 16 ounce and worked to the designs indicated by $\frac{3}{4}$ -inch details and full-size details to be furnished by the contractor and to have the architect's approval. Conductor pipes to be constructed of corrugated copper and to be 4 by 3 inches and provided with ornamental boxes and straps as indicated on the elevations.

TIN.—Wherever tin is required by the drawings, same to be equal to "Taylor Old Style" IC for roofing tin and IX for all gutters, valleys, flashings, etc., sheets, 28 by 20 inches, well soldered together, using only resin for flux. All to be painted on the underside before being laid with one coat metallic paint and pure linseed oil.

SKYLIGHT.—Where indicated on drawings, there is to be provided a skylight, same to be constructed of No. 24 B. & G. galvanized iron with condensation drip and gutters with ridge ventilator. Glaze skylight with heavy $\frac{1}{4}$ -inch thick ribbed, wire glass; all guaranteed for a period of five years.

TILE ROOF.—All the pitch roof to be covered with red unglazed tile, tile to be of American-Spanish "S" or equal tile with all necessary closures, hip rolls, finials, etc., manufactured by the Cincinnati Roofing Tile and Terra Cotta Company, or their equal in the opinion of the architect.

All tiles to be nailed with galvanized wire 6d. nails to the sheathing with an intervening layer of 2-ply "Black Diamond" prepared roofing felt between tile and sheathing.

Last layer of tile next to skylight and tiles at ridges and hips to be laid in red elastic cement.

Tile well flashed at valleys and around vents and chimneys with 4-pound sheet zinc.

RED SLATE (ALTERNATE NO. 1).—Contractor shall furnish an alternate proposal for using Mathew's Unfading Red Slate or equal, 8 by 14 by $\frac{1}{4}$ inch in thickness. Slate to be laid over two layers of 2-ply "Black Diamond" prepared roofing felt between slate and sheathing.

All slate to be securely held in place with galvanized wire 6d. nails.

Last layer of slate next to skylight and slate at ridges and hips to be laid in red elastic cement.

BANGOR SLATE (ALTERNATE NO. 2).—Contractor shall furnish an alternate proposal for using Bangor slate or equal, 8 by 14 by $\frac{1}{4}$ inch in thickness. Slate to be laid over two layers of 2-ply "Black Diamond" prepared roofing felt between slate and sheathing.

All slate to be securely held in place with galvanized wire 6d. nails.

Last layer of slate next to skylight and slate at ridges and hips to be laid in black elastic cement.

FIREPROOFING: REENFORCING CONCRETE.

GENERALLY.—The system of reinforcing concrete shown by the plans and described by these specifications is to be considered as illustrating what is desired for concrete construction. Other systems of reinforced concrete will be

taken into consideration by the architect, providing only that the contractor submits with his proposal drawings demonstrating the system it is proposed to substitute for that shown.

It is the intention of these specifications to include all that is best in materials and workmanship. Especial attention must be exercised in this connection to the quality of labor and character of workmanship.

Reinforcements shall be composed of individual bars so designed as to present a mechanical bond with the concrete. Nettings, forms of expanded metal, or any reinforcement not providing for sheering stresses will not be considered.

It must be understood, furthermore, that no system of reinforced concrete construction will be considered which has not been approved by the building department of all the principal cities of the United States.

Dimensions of beams, columns, slabs, and other structures indicated on drawings shall be considered a minimum. **CEMENT.**—The term "Portland cement" is understood to apply to the finely pulverized product resulting from the calcination to incipient fusion of an intimate mixture of properly proportioned argillaceous and calcareous materials and to which no addition greater than 3 per cent has been made subsequent to calcination.

Only the leading brands of Portland cement will be permitted. Same must be of uniform quality and shall be inspected either at the place of manufacture or on the work.

The minimum requirements for tensile strength for briquettes 1 inch square in section shall be within the following limits and shall show no retrogression in strength within the periods specified:

Neat cement:

24 hours in moist air, 150 to 200 pounds.

7 days (1 day in moist air, 6 days in water), 450 to 550 pounds.

28 days (1 day in moist air, 27 days in water), 550 to 650 pounds.

SAND.—(Only clean sand shall be used. It shall be coarse and sharp, with grains of various sizes, and also contain the smallest possible percentage of voids.

GRAVEL AND STONE.—If it is possible to obtain a gravel which contains sufficient sand to fill the voids and free from dirt, the same will be permitted for use, providing the larger pebbles do not exceed 1 inch in diameter. In larger sections, however, where the mass of concrete in its smallest direction is over 18 inches, pebbles may be used up to and including $1\frac{1}{4}$ inches in diameter. If broken stone is used instead of gravel it should be of hard, close-grained quality, clean and free from argillaceous or organic matter. Broken slag, unless free from sulphur, will not be permitted. The limitations to the size of broken stone are the same as those for gravel.

PROPORTION.—All concrete for beams and columns shall be proportioned of 1 part Portland cement, 2 parts sand, and 4 parts broken stone; for floor slabs and footings, 1 to $2\frac{1}{2}$, and 5 of the above materials. If a combination of gravel and sand is used the proper proportion of these materials must be used so as to obtain a similar mixture.

When slabs are 3 inches or less in thickness the concrete shall be mixed in proportions of 1 part Portland cement and 3 parts sand.

The proportioning of materials shall be done by means of a bottomless box and each of the materials shall then be accurately measured.

MIXING.—All concrete shall be machine mixed, using either a batch or continuous mixer of approved design. Plenty of clean water should be used so that the resultant mixture will be of such consistency that when slightly rammed it will quake. The amount of water should be decreased during cool or freezing weather. In general the mixture should be fairly wet. All materials should be first thoroughly mixed dry, after which the proper amount of water is added, and the mixing should continue until the concrete is uniform. A competent foreman must be in constant attendance at the mixer to give his approval of every batch that leaves the machine.

FINISH SURFACES.—When desired that the concrete be left in a finished state, or where future plastering is not considered advisable, the molds shall be made of lumber dressed on all sides and edges, laid with close joints, and the concrete in this case shall be made exceptionally wet to correspond with a jelly-like mass.

REENFORCING STEEL.—Sufficient steel must be placed so that the concrete will be obliged to resist only direct compression and shear up to 30 pounds per square inch. No steel should have at any point less than 1 inch of concrete covering. Steel will not be painted. A slight film of rust will not be objectionable on same, but any bar on which decided rust scales have formed will be rejected. In no case will steel of higher elastic limit than 45,000 pounds be considered.

PLACING CONCRETE.—Concrete should be deposited in layers not exceeding 6 inches in thickness and compacted as much as possible by tamping. As far as possible each layer should be placed before the one previously deposited has set. However, when an adjoining layer has set the exposed surface should be cleaned and covered with a thin grout of cement before applying the next layer.

CENTERING.—The centering must be true and rigid and properly braced, and of sufficient strength to carry the dead weight of the construction as a liquid, without any deflection.

All joints must be fairly tight, so as to prevent leakage of the liquid mass.

FINISHED SURFACES.—When finished surfaces are desired for beams, girders, or slabs, use a mortar or 1 or 2 parts of Portland cement and sand, and plaster same to the inside of wooden forms. Finish on walls should be formed by spading back from the surface and flushing with grout so as to obtain a coating at least $\frac{1}{2}$ inch thick on the exposed face.

Only one grade of cement will be used on any one finished surface, because no two grades of cement have exactly the same color. The molds adjoining the finished surface must be absolutely clean, with very close-fitting joints. Absolutely no salt must be used in the concrete where a finish surface is desired. When an extra fine surface is desired, use smoothly dressed timber, the pores of which are filled with soap or paraffin well rubbed in.

After the forms are removed, any small cavities or openings in the concrete shall be neatly filled with mortar if necessary. Any ridges due to cracks or joints in the lumber shall be rubbed down. The entire face shall be then washed with a thin grout of the consistency of whitewash, mixed in a proportion of 1 part cement and 2 parts sand. The wash shall be applied with a brush.

TEST.—Floor shall be tested after centering has been removed one month, in accordance with the rules and regulations of the building department of the city of Lawton, or 300 pounds to the square foot. Floors to be tested to a uniformly distributed load over an entire panel. In testing there shall not be a deflection of $\frac{1}{100}$ part of the span, and this shall return to its normal position after the removal of the load.

CONTINUOUS ACTION.—Where continuous action may be obtained, bending moment should be considered $\frac{1}{10}$ W. L. In plate construction the bending moment may be figured at $\frac{1}{15}$ W. L.

CINDER CONCRETE.—Cinder concrete floors from top of fireproof construction to be generally 2 inches thick and to be composed of 1 part Portland cement to 2 parts sand and 5 parts screened cinders.

TERRA-COTTA PARTITIONS.—Where called for by drawings terra-cotta partitions to be of the sizes shown, of the best quality, evenly burnt, free from all cracks and other defects, hollow-block terra cotta. No patching or hiding of defects will be allowed. All to be laid up in cement mortar, breaking joints, bonding corners, and all perfectly true and plumb. Form arches over all openings.

PLUMBING.

GENERALLY.—All vertical pipes must be true to a plumb.

All horizontal lines must have a fall of at least $\frac{1}{4}$ inch per foot.

All horizontal vent pipes must be laid to drain to fixtures.

All horizontal line of pipe must be supported every 10 feet by proper wrought-iron hangers securely fastened to floor beams or by 8-inch brick piers, or where running under cellar floor or ground must be supported on a well-rammed bed of earth.

All vertical lines of pipe must be supported by being hung from the floor or walls of building in the "Netherland" or other approved pattern pipe hangers.

No offsets are to be made except with eighth bends.

Changes in direction must be made by the use of proper fittings. No skewed joints or bowed pipes will be allowed. Connections between cast-iron vertical and cast-iron horizontal lines must be made with Y branches and eighth bends.

Pipes passing through brick walls must be protected by cast-iron sleeves.

All openings about pipes through floors, ceilings, walls, or partitions, marble or slate, must have red metal finish, cast-brass escutcheons on each side where exposed, screwed to wrought-iron sleeves.

All pipes passing through the roof must be flashed with 16-ounce sheet copper 18 inches square, securely fastened to the roof and calked into the iron pipe hub and free to expand or contract.

All pipes extended through roof must be carried 1 foot above roof and be not less than 4 inches in diameter.

All open ends of soil or vent pipes must be protected by globe cages made of No. 12 galvanized-iron wire.

Cast-brass screw-cap clean outs are to be left in accessible positions at ends of all horizontal line of pipes and elsewhere as shown on drawings.

All brass unions on waste pipes are to be ground unions set in red lead. No unions to be used on the sewer side of basin or other traps.

No work shall be covered before it has been examined and approved by the superintendent. Any unfaithful work or defective material must be immediately corrected.

CAST-IRON PIPE.—All cast-iron pipe and fittings are to be uncoated, extra heavy, sound, smooth, and free from flaws, cracks, sand holes, or other defects, and of standard manufacture and of the following weights per foot:

- 2-inch diameter, 5½ pounds.
- 3-inch diameter, 9½ pounds.
- 4-inch diameter, 13 pounds.
- 5-inch diameter, 17 pounds.
- 6-inch diameter, 20 pounds.

All joints are to be made with picked oakum and molten lead, well calked. No putty or cement will be allowed about joints. After being tested, all pipes underground are to be coated with asphaltum, applied hot.

WROUGHT-IRON PIPE.—All wrought-iron pipe is to be of "standard" wrought-iron pipe of approved make, galvanized, factory tested to 300 pounds per square inch, hydraulic pressure; certificates of test to be furnished. To be of the following weights and thicknesses per foot:

- 1½-inch diameter, 0.14 inch thick, 2.68 pounds.
- 2-inch diameter, 0.15 inch thick, 3.61 pounds.
- 2½-inch diameter, 0.20 inch thick, 5.74 pounds.
- 3-inch diameter, 0.21 inch thick, 7.54 pounds.
- 3½-inch diameter, 0.22 inch thick, 9 pounds.
- 4-inch diameter, 0.23 inch thick, 10.66 pounds.
- 4½-inch diameter, 0.24 inch thick, 12.34 pounds.
- 5-inch diameter, 0.25 inch thick, 14.50 pounds.
- 6-inch diameter, 0.28 inch thick, 18.76 pounds.

All traps and fittings on drainage line are to be shouldered heavy cast-iron drainage fittings, galvanized, with threads tapped so as to give uniform grade to branches of not less than ¼ inch per foot.

Fittings on vent lines are to be the ordinary cast galvanized or malleable steam fittings.

All joints to be screw joints, set up in red lead.

LEAD PIPE.—The use of lead pipe is restricted to the short branches of the soil, waste, and vent pipes.

All lead soil, waste, and vent branches used are to be of D drawn-lead pipe of the following weights per foot:

- 1½-inch diameter, 3 pounds.
- 2-inch diameter, 4 pounds.
- 3-inch diameter, 6 pounds.
- 4-inch diameter, 8 pounds.

Joints in lead pipe are to be wiped-solder joints.

Joints between lead pipe and brass fittings are to be wiped-solder joints.

Connections between cast-iron and lead pipes are to be made by means of cast-brass ferrules, calked in hub of iron pipe, and wiped-solder joints.

BRASS PIPE.—All brass pipe for soil, waste, vent pipes, and soldering nipples must be thoroughly annealed, seamless drawn-brass tubing of standard iron-pipe gauge.

Brass ferrules must be best quality, bell-shaped, extra heavy cast brass, not less than 4 inches long and not less than the following weights and sizes:

- 2¼-inch, 1 pound.
 - 3½-inch, 1 pound 12 ounces.
 - 4½-inch, 2 pounds 8 ounces.
- Soldering nipples must be of brass pipe of iron-pipe size, or of cast brass of the following weights:
- 1½-inch, 8 ounces.
 - 2-inch, 14 ounces.
 - 2½-inch, 1 pound 6 ounces.
 - 3-inch, 2 pounds.
 - 4-inch, 3 pounds 8 ounces.

Brass screw caps for clean-outs must be extra heavy, not less than ⅛ inch thick, and flange ⅛ inch thick.

The body of the clean-out ferrule must be at least equal in weight to the calking ferrule for the same size of pipe. Connections of brass pipe and between brass and iron pipe must not be made with slip joints or couplings. Threaded connections on brass pipe must be the same as iron-pipe threads for the same size of pipe and tapered.

EXPPOSED METAL WORK.—All exposed metal work about fixtures, pipes, traps, seat hinges, legs, standards, holdfasts, clamps, flange bolts, screw washers, faucets, etc., are to be of polished brass with nickel-plated finish, except where otherwise specified.

SEWER.—Where shown on drawings, run sewers of sizes shown of cast-iron pipe laid with a pitch of $\frac{1}{4}$ inch to the foot, connecting same with street sewer in a proper manner.

MANHOLE.—Manhole is to be constructed of concrete. All connections are to be accurately fitted. Y branches and cleanouts are to be placed in this manhole, so as to be readily accessible for cleaning or repair.

TRAPS.—Are to be cast-iron running traps, of sizes marked for each section, with handhole cleanout and fresh-air inlet on house side.

FRESH-AIR INLETS.—Are to be 6-inch cast iron from house trap to grade at point 25 feet from walls, terminating in a grating or cowl.

LEADER DRAINS.—Are to be of cast iron, generally 4-inch.

Place cast-iron trap on leader drain immediately before connection to house drain.

The bend and vertical pipe, up to point 1 foot above grade, is to be of cast iron and connected to sheet-metal leaders.

AREA DRAINS.—Are to be of 3-inch plate A631, except to be fitted with running traps and waste instead of bell traps.

Provide with bend, couplings, and strainer of cast iron in each area.

SOIL LINES.—Continue 4-inch cast-iron pipes up through roof, taking off the required branches for fixtures.

WASTE LINES.—Continue 2 and 3 inch cast-iron waste lines as shown.

VENT LINES.—Mains to be 2 and 3 inch cast iron, tapped into soil or waste pipe above highest fixture and at bottom, so as to discharge rust and be flushed out if practicable.

BRANCHES.—Branches of fixtures to be of the following sizes:

	Waste.	Vent.
	Inches.	Inches.
Water-closets.....	4	2
Urinals.....	2	1½
Sinks.....	2	1½
Lavatories.....	2	1½

All waste branches are to be cast iron; all vent branches to be wrought iron.

Lead bends are allowed only for water-closets.

TESTS.—On completion of the rough work, including all lead bends, vent pipes, and branches, close all openings (except above roof) and fill the entire system with water, which must stand two hours without leak or loss of water, to the entire satisfaction of the architect and inspector.

On final completion of the work, after all fixtures are set, the contractor will apply smoke or peppermint test to the entire drainage system.

Any leaks or defects discovered and any damage caused by these tests is to be repaired and the tests repeated until satisfactory.

WATER SUPPLY SYSTEM.

GENERAL RULES.—All supply pipes must be laid to drain and kept straight without sagging or bowing.

All supply pipes must be kept at least 9 inches from any steam pipe, and not in the same chase with steam pipe.

All supply pipes must be properly secured in place with approved pattern hangers of the same material and finish as the pipes they support.

Vertical lines must be firmly supported at the middle of their lengths. Long horizontal lines of service pipe for hot water are not to be confined at ends, but so arranged as to allow of free expansion and contraction.

All branch fixtures must have 8-inch air-chamber extensions. All main supply lines must be extended 3 feet above highest fixture.

Ground unions must be placed in runs of pipe at frequent intervals to admit of ready repair.

CAST-IRON PIPE.—All cast-iron supply pipes are to be heavy supply pipe that meets the requirements of the water department of the city of Lawton.

All supplies underground, 3 inches or larger, are to be cast iron.

All joints are to be calked with lead.

LEAD PIPE.—All lead supply pipe is to be AA grade and must weigh—

¾-inch diameter, 3 pounds 8 ounces per foot.

1-inch diameter, 4 pounds 12 ounces per foot.

1½-inches diameter, 7 pounds 8 ounces per foot.

2-inches diameter, 9 pounds per foot.

All supplies underground, less than 3 inches, are to be of lead.

All joints are to be soldered.

WROUGHT-IRON PIPE.—All supply pipes throughout, unless otherwise specified, are to be “standard” galvanized wrought-iron pipe, with heavy galvanized fittings.

All supply pipes are to be exposed to view where possible.

All joints are to be screw joints, set in red lead.

BRASS PIPE.—All supplies exposed to view in toilet rooms are to be seamless-drawn brass tubing and cast-brass fittings and screw unions, of iron pipe sizes, put together in red lead and secured in position with brass hangers; all to be polished and have nickel-plated finish, and of the following weights per foot:

½-inch diameter, 0.109 thickness, 0.78 weight.

¾-inch diameter, 0.109 thickness, 1.22 weight.

1-inch diameter, 0.120 thickness, 1.63 weight.

1¼-inch diameter, 0.148 thickness, 2.52 weight.

1½-inch diameter, 0.148 thickness, 2.94 weight.

2-inch diameter, 0.165 thickness, 4.28 weight.

All fittings to be of heavy cast brass; joints to be set in red metal.

All changes in direction to be made by bending the pipe. The least radius of any bend to be five diameters of the pipe bent. Bends on parallel runs of pipe to be parallel and equidistant.

VALVES.—All valves less than 2 inches in diameter shall be heavy brass, wheel-handle, single gate valves. Valves larger than 2 inches in diameter to be iron body, brass mounted, wheel-handle, double gate valves. All valves to be of Eddy Manufacturing Company’s make or equal, with raised disks and improved high pressure, removable washers.

All check valves of 3 inches or larger to be extra heavy iron body, brass mounted, swinging check valves of Burnham self-adjusting pattern.

Check valves less than 3 inches in diameter to be heavy brass lifting check valves of globe pattern.

All valves are to be labeled with brass tags, and a drawing, including complete index, showing supply system, to be furnished, framed, and glazed.

Provide valves on water supply at points indicated on drawings.

Also provide valves on all branch mains at headers and at the foot of all rising lines, and at each group of fixtures on each story and at head of down supply of flushing system and at tank.

Also provide check valves at return headers on hot-water supply.

PIPE COVERING.—Is to be Keasby & Mattison’s or H. W. Johns-Mansville Company’s or other approved sectional covering of standard thickness, and to contain not less than 85 per cent carbonite of magnesite. All fittings and valves shall be covered with plastic material to correspond, and shall have extra canvas pasted on. All sections shall have the usual canvas on when applied, and be properly pasted down and banded with lacquered brass bands.

All hot and cold water supply and return pipes, headers, hot-water generators, etc., throughout, are to be covered.

SUPPLY ARRANGEMENT.—Tap the street main in front of the building with 2-inch tap.

Lay 2-inch lead supply underground to point indicated on drawings.

Place where indicated 4-inch galvanized iron header and from this take out the various mains of sizes marked to supply the different fixtures.

FIRE SERVICE.—Where shown on drawings contractor is to run a 1½-inch standpipe provided where indicated with 1¼-inch outlets for hose connections, plugging same.

HOT-WATER SUPPLY ARRANGEMENT.—From hot-water generator take 1¼-inch supply to 6-inch header, from which take the branch mains to the groups of fixtures and returning at next group, taking off the required branches to fixtures and continuing 1¼-inch return line back to 4-inch header, and connecting to generator. Sizes of all lines as marked on drawings. Branches, etc., not marked, of same size as cold-water supplies. This must all be arranged and graded so as to circulate freely by gravity.

All fixtures throughout, except water-closets and urinals, to be supplied with hot water.

SETTING FIXTURES.—The contractor is to receive, store, protect the fixtures as delivered, and at proper time to set, connect, and adjust same, and at completion to clean same, polishing all polished work, and leave same in perfect condition.

The contractor is to supply any other exposed work required about the fixtures, not mentioned in the description, same to be polished brass, with nickel-plated finish, to correspond to other work.

The contractor is also to supply traps which are not included in the following schedule and description.

PLUMBING FIXTURES.

GENERAL CONDITIONS.—The contractor is to provide and deliver at site, in good condition, all the following fixtures:

For purposes of illustration as to the kind, quality, finish, etc., required, reference is made to J. B. Clow & Sons' catalogue, but fixtures equal in design, quality, finish, etc., to those mentioned, and as per the detailed lists of the respective manufacturers may be furnished, said list to be approved by the architect and filed in his office.

Where "vitreous" ware is specified, goods are to be vitreous earthenware porcelain, baked in accordance with the approved method of vitreous ware manufacturers.

Where "porcelain" goods are specified they are to be earthenware porcelain enameled all over.

Where enameled iron is specified it is to be cast iron, heavily coated with porcelain enamel, and must be entirely free from defects and equal to the grade mentioned ("A" or "B") and guaranteed by the manufacturer.

All metal work is to be of heavy cast brass, free from defects, and carefully polished, and to have a nickel-plated finish.

Schedule of fixtures.

BASEMENT.

Location.	No.	Fixture.	Plate No.
Boys' lavatory	5	Water-closet.....	M1860
Girls' lavatory	6	Water-closet.....	M1860
Boys' lavatory	3	Lavatory.....	R229
Girls' lavatory	3	Lavatory.....	R229
Boys' lavatory	1	Urinal.....	N268
Janitor's room.....	1	Sink.....	S988
Hall.....	1	Drinking fountain.....	R735

URINAL.—Urinal to be of slate 10 feet long and equipped with 10-gallon automatic flush tank No. N370.

SINK.—Sink to be 22 by 18 inches, enameled inside and back and to have three coats of paint where not enameled.

DRINKING FOUNTAIN.—Drinking fountain is to be equal to the hygiene and to be equipped with self-closing regulating stop valve with lever handle.

FIRST FLOOR.

Location.	No.	Fixture.	Plate No.
Hall.....	1	Drinking fountain.....	R735

SECOND FLOOR.

Teachers' toilet.....	1	Water-closet.....	M1625
Teachers' toilet.....	1	Lavatory.....	Q253
Hall.....	1	Drinking fountain.....	R735

WATER-CLOSETS.—Where M1860 closets are mentioned in schedule, to be vitreous porcelain with sanitary screw connections, with galvanized-iron flush tank, with self-raising oak seat and Madden automatic valves.

Where M1625 closets are mentioned in schedule, to be vitreous porcelain with sanitary screw connections, with oak copper-lined tank, seat, and lid.

For all water-closet partitions provide nickel-plated finish, with cast-brass legs, with deep slot to receive 1-inch partition; to have two bolts to each. Top support to be post with ball tee, with slot to receive partition, as described, for legs. Back supports to be 5-inch flanges, attached to wall with expansion bolts. Top rail to be 1½-inch nickel-plated brass pipe. Rail to be 7 feet above floor and attached at each end to wall with 5-inch flanges and expansion bolts.

LAVATORIES. Where R229 lavatories are mentioned in schedule, to be of porcelain-enamelled iron, complete, with self-closing basin cocks, with china centers marked "Hot" and "Cold."

Where Q253 lavatories are mentioned in schedule, to be of vitreous ware, complete, with self-closing basin cocks, with china centers marked "Hot" and "Cold."

HOT-WATER HEATER. Furnish, set up, and connect, where shown on basement plan, one No. 1 automatic hot-water heater, with regulating valves, relief valves, steam and water gauge, thermometer, and trap. (Plate F86.)

WALL HYDRANTS.—Furnish and set, where shown on plumbing plan, a ¾-inch wall hydrant. (Plate A763.)

HEATING AND VENTILATING.

GENERALLY.—Plans and specifications for heating are intended to illustrate what is desired. Other systems of heating and ventilating will be considered if plans and specifications for the same are submitted with the proposal at the time the proposals are opened for the construction of the building.

It is understood that these specifications apply to apparatus fully erected and in condition for successful operation. They are understood to apply also to any subcontract or contracts that may be entered into for the supplying of materials or the construction of the various parts of this work.

All materials entering into the installation must be new and of the quality specified, otherwise to be of the best commercial quality obtainable for the purpose. All parts of the work and the erection thereof must be performed in the best and most substantial manner.

Any article not shown on the plans or mentioned in these specifications or inadvertently omitted from either, but necessary for the proper completion of the work to the true intent and meaning of these specifications, must be furnished without extra charge.

Plans and detail sketches are submitted to limit, explain, and define the structural conditions, specific requirements, pipe sizes, and manner of erecting the work. The structural conditions may require certain modifications in piping and manner shown for running same, and such modifications are permissible, but the pipe sizes and certain necessary and specific requirements proper for the satisfactory working of the system will remain unchanged.

Additional detail and working drawings will be furnished from time to time as they may be required, and it is to be distinctly understood that all such drawings shall be of equal force with those which are herein specifically cited, and the said additional drawings are to be considered as virtually embraced within and forming part of these specifications.

DRAWING.—Drawings Nos. 12 and 13 show the heating layout for basement, first, second, and attic floors, and will be considered in connection with the specification.

DESCRIPTION OF WORK.—The above drawing, together with these specifications, are intended to fully describe a mechanical system of heating and ventilating with a certain amount of supplemental direct radiation in the teachers', principal's, and toilet rooms of the school building at Lawton, Okla.

Steam will be taken from a low-pressure heating boiler placed in pit in basement.

The returns from the system will flow by gravity back to the boiler through an air-separating tank.

Each radiator is to be equipped with a Webster modulation valve and Webster water-seal motor.

Each section of Vento radiation in the basement will be provided with one or more Webster water-seal motors. The Webster modulation system is to be used in this building.

All necessary material, piping, fan, motor, boiler, and all other specialties required to make this a complete installation, are to be furnished and erected under these specifications.

BOILER.—Furnish, deliver, and erect in pit in boiler room, in approximate location shown on basement plan, one cast-iron sectional boiler having a guaranteed capacity of not less than 8,300 square feet of direct radiation when operated in connection with the Webster modulation system. This boiler is to be furnished with all necessary appliances for operating same by steam, including a Webster low-pressure damper regulator, safety valve, water column, steam gauge, flue brush, poker, slice bar, shovel, and other necessary firing tools.

Boiler is to be equal in every respect to that manufactured by the American Radiator Company, H. B. Smith Company, and J. L. Mott Iron Works, or as may be approved by the architect.

Three 6-inch outlets are to be provided in this boiler and are to be located as shown on plan. The velocity of the steam passing through these outlets shall not exceed 15 feet per second. These outlets will be connected to the main 6-inch header with due regard for expansion and contraction.

Boiler is to be tested to 50 pounds hydrostatic pressure and is to be constructed so that it can operate at 10 pounds working pressure. The above pressures are for testing purposes only, as the boiler in operation will run at about 1 pound pressure.

The size of the smoke pipe to chimney is to be not less than 21 inches in diameter. If a rectangular smoke connection is used, it is to be of equivalent area.

The joints in the smoke connection are to be made air-tight.

The damper regulator on boiler is to be so connected that it will operate the check-draft door in the ash pit and check damper in the smoke collar.

Boiler must be provided with outlets for the purpose of supply and drawing off water.

The contractor will run a $\frac{3}{4}$ -inch galvanized-iron pipe from an outlet provided in cold-water main to supply water to boiler. The drain line from boiler will be $1\frac{1}{2}$ inches in size and is to run to sewer or where directed by the architect. If the water pressure is not sufficient, other suitable means are to be provided for filling the boiler.

These plans contemplate the use of a boiler having a water line not to exceed 72 inches. If a higher water line is used a correspondingly deeper pit will have to be provided for the boiler.

AIR-SEPARATING TANK.—For the purpose of separating the air from the condensation in the heating system, an air-separating tank is to be furnished and installed by this contractor, and is to be made of a piece of 12-inch pipe 4 feet long, capped at both ends.

This tank is to be placed in approximate position shown on plan, suitably supported from ceiling or side wall.

Tank will be placed at such height so that there will be 48 inches between the center line of the return inlet of same and the water line in boiler. At one end near top this tank will be tapped 2 inches for the returns from the heating system. At the opposite end near the bottom a $2\frac{1}{2}$ -inch tapping is to be provided for connection to the boiler. From the top of tank a $1\frac{1}{2}$ -inch vent connection is to be run to point as indicated, thence up through the building to above roof through a $1\frac{1}{2}$ -inch Webster vent valve.

SUPPLY PIPING.—Commencing at outlets on boiler, three 6-inch connections will be taken and run to a 6-inch header located above boiler. From the end of this 6-inch header a 6-inch line will be taken and run overhead in basement to supply the various radiators and cast-iron Vento heater sections.

The center line of this 6-inch supply main where it leaves boiler room will be approximately 6 feet 6 inches from the basement floor. This main will continue 6 inches in size to a point where the reheating sections of the Vento radiation are taken off, where it will decrease to 4 inches, and then continue in general direction and of sizes shown on plan. The grade of this main will be 1 inch in 30 feet.

In this 5-inch main at point near boiler, a 2-inch line will be taken from the top of same to supply radiators in the toilets, principal's and teachers' rooms. Both this 6-inch and 2-inch main will be fitted with a gate valve.

The connections to the Vento radiation in the reheating and tempering sections will be taken from the top of the main, each connection being fitted with a gate valve.

The size of the supply connections to the tempering sections are each to be 2 inches. In the reheating sections the sizes are as follows:

First and second sections, 2—2 inches.

Third section, 2— $1\frac{1}{2}$ inches.

Fourth section, 2— $1\frac{1}{4}$ inches.

The ends of the 3-inch mains supplying radiation in the hot-blast sections will be dripped through a $\frac{3}{4}$ -inch Webster water-seal motor into return main.

The ends of the $1\frac{1}{4}$ -inch mains in toilet rooms are to be dripped through a gate valve, a Webster class "B" dirt strainer, and $\frac{3}{4}$ -inch Webster water-seal motor into an overhead return.

If it becomes necessary, due to structural conditions, to run this main differently from that shown on plan, where a rise occurs, the supply main will be dripped through a Webster water-seal motor into return main.

The run outs from mains to risers and radiators are to be taken from top and given a good grade back to main.

The sizes of piping must be as noted on plan, which will be the minimum allowed.

The sizes of the supply and return risers to the various radiators are shown on heating plan.

RETURN PIPING.—Connecting with the various units of radiation a system of return mains will run overhead in basement of sizes and in general direction shown on plan, and connect into the air-separating tank placed in cloak-room. The various risers will be connected to the return main in basement.

Where this return main connects to air-separating tank, the center line of same will be approximately 6 feet from the basement ceiling and 48 inches above the water line in boiler.

From the opposite end in the bottom of tank a 2½-inch connection will be taken and drop to the floor line of basement. Where this 2½-inch main crosses corridor, it will be covered with a cast-iron cover plate. This main will run 2½ inches all the way to the boiler pit, where it will drop and connect with boiler.

Previous to connection to boiler a 2½-inch special return valve will be placed.

The 1-inch drip lines from the 3-inch main in fan room will connect into this 2½-inch main just previous to where main connects to air-separating tank.

All other piping necessary to make this a complete low-pressure steam installation is to be done under these specifications.

The hot-blast tempering and reheating sections are to be placed as near the ceiling as possible, so that the return from same can gravitate back to the air-separating tank.

Return piping must grade not less than 1 inch in 30 feet in direction of flow of condensation.

Should the sewer be above the level of the drain from the boiler, this contractor is to furnish a draining apparatus acceptable to the architect.

RADIATION.—Direct radiation is to be placed in the approximate location shown on plan. It must be equal in every respect to the Fowler & Wolfe or Rococo wall type, where wall radiators are shown, and three column Rococo or equal where standard radiators are shown.

The radiation on the upper floors is to be placed as shown, or as the architect may direct. In the basement it will be hung overhead. The hangers for this basement radiation are to be of the cast-iron type acceptable to the architect. Each hanger is to be provided with a suitable batton.

Radiation in basement is to be hung close enough to ceiling so that the laterals to ceiling radiators can grade back to mains.

All wall radiation is to grade toward the return end not less than 1 inch in every 30 feet.

All radiators used throughout the building must be of the hot-water type, having the top as well as the bottom connection. They will be tapped at the top ¾ inch for radiators up to and including 80 square feet, and 1 inch above to receive the Webster modulation valve. At the bottom, in the opposite end, they will be tapped ½ inch to receive the Webster water-seal motor.

The return connection must be made at the lowest point of the radiator so as to perfectly drain the water of condensation at all times. This is to be accomplished by the use of a drip hub pattern radiator or an eccentric bushing with the outlet turned down.

Direct radiators will not be tapped for air valves, as such valves are not used in connection with the Webster modulation system.

The contractors supplying all new radiation ordered for this work shall, if they are called upon to do so, demonstrate to the satisfaction of the owners or their representatives that the radiation furnished contains in each section of the different types supplied the amount of prime heating surface mentioned in their published list of the respective types. This must be demonstrated by actual measurement and the development of the exposed surface of the sections.

FAN.—Furnish and install in basement in approximate location shown on plan one Sirocco, Multivane, or equal, single inlet, full housed, top horizontal discharge fan, capable of delivering not less than 18,000 cubic feet of air per minute when run at a speed of not over 200 revolutions per minute.

Fan is to be heavily braced with bar, angle, and toe irons to prevent vibration and must be noiseless in its operation.

The connection between fan and reheating coil is to be made by means of a piece of 12-ounce canvas not less than 12 inches wide. All other necessary ironwork for the complete installation of this fan is to be furnished and installed under these specifications.

The bottom line of the outlet on fan is to be approximately on the same level as the center line of the fan in order to allow a freer passage of air from the fan through by-pass underneath reheater.

The scroll of the fan is to be extended beyond the center line to prevent the air from churning in the fan. The wheels of the fan are to be supported from the proper number of spiders and to have the necessary number of blades, set at the proper angles to deliver the amount of air without undue vibration or weakness in any part of the fan.

A suitable ring oiling, self-aligning bearing is to be provided to support the fan shaft. The journal boxes are to have a large oil reservoir from which the shaft will be continuously oiled by means of a number of oil rings. The oil reservoir is to be fitted with a brass pet cock.

The fan must be approved by the architect.

The foundations of the fan will be provided under the general building contract. This contractor will, however, furnish the necessary templates for the fan, tempering coils, and reheating coils to the general contractor so that the foundations will be made to suit the various apparatus.

MOTOR.—Furnish, deliver, and erect for operating fresh-air fan, a motor, capable of delivering not less than 5 break horsepower at the fan shaft when direct connected to shaft.

The current is to be taken from the electric service lines in Lawton, Okla., and motor shall be wound in accordance with the current used.

The motor must be so designed as to carry its full load without undue heating or sparking.

The motor bearings will be of the ring oiling type and will be lined with the best antifriction metal.

The necessary starting box, cut-out switch, and the Cutler-Hammer Manufacturing Company's universal compound speed regulator and all other electric apparatus and wiring are to be furnished and installed by this contractor. Motor is to be set upon an approved foundation.

TEMPERING HEATER.—Furnish and erect in approximate location shown on plan, one tempering heater consisting of two groups, each group containing two 6-row sections of 40-inch high Vento radiation, same as manufactured by the American Radiator Company.

This tempering heater is to have a net free area through same of not less than 8.75 square feet through each group, or 17.5 square feet for both.

This tempering heater is to be hung as near to ceiling as possible so that the condensation from same can drain by gravity back to the air-separating tank.

The velocity of the air passing through tempering heater shall not exceed 1,000 cubic feet per minute.

REHEATER.—Furnish and erect in approximate location shown on plan a reheater consisting of two tiers high and four rows deep, each row to contain 14 sections of 40-inch high Vento radiation of 1,118 square feet heating surface. It will be hung as close to ceiling as possible, the same as the tempering heater.

The necessary supply and return connections are to be made to the reheater and tempering heater. Each section will be provided with a suitable gate valve so that it can be closed off.

Suitable supports are to be provided for both the tempering heater and reheater.

Under the reheater there will be provided a by-pass so that the fan can blow tempered air into the tempered-air chamber.

COLD-AIR INLET.—The openings used as fresh-air inlets will be provided by the general contractor. The net free area through these openings shall not be less than 12 square feet each after allowance is made for area obstructed by fly screen.

Under these specifications guards will be built of copper fly screen with strong angle-iron frames to support same to prevent objects from entering fan. These screens are to be placed in fresh-air inlet and are to be hinged so as to allow for opening and closing.

Suitable opening will be provided in the tempered-air chamber with an air-tight door so that the same may be accessible from the fan room.

HEAT AND VENT FLUES.—The heat and vent flues in this building will be constructed under the building contract. These flues are to be plastered smooth and evenly so that the air will have a free passage through same. They will not be lined with galvanized iron. The connections to and from the flues will be made by means of a galvanized-iron hood. These hoods will be furnished by the heating contractor.

GALVANIZED-IRON WORK.—Galvanized-iron hot and tempered air ducts are to be made of sizes as shown on drawing, all turns and bends to be made with easy curves and all joints made tight.

All ducts are to be made with a view toward the omission of undue friction, and must be made by mechanics especially familiar with this class of work.

All air ducts in basement are to be made of the following United States standard gauge galvanized iron:

For rectangular ducts 18 inches wide and below No. 26 gauge; 19 to 26 inches, No. 24 gauge; 27 to 50 inches, No. 22 gauge; above 50 inches, No. 20 gauge.

The sizes of the galvanized hot-air ducts are clearly shown on plan.

The tempered air ducts which run directly under the hot-air ducts will be the same width, but only two-thirds as deep. There will be at least a 1-inch space between these two sets of ducts.

The main ducts leading from the fan will be fitted with deflectors so that the passage of air will be directed toward the various flues.

Each hot and tempered air duct will be provided with a tight quadrant-volume damper so as to regulate the amount of air entering each duct.

All vent flues in the attic will be fitted above the attic floor with galvanized iron, the same size as the flue and 18 inches high. In this galvanized-iron connection will be placed a quadrant-volume damper.

The top of these vent flues will open into the attic space. The foul air from these vent flues will be discharged through louvres in belvedere located centrally on top of building. This belvedere, together with the louvres in same, will be constructed under the building contract. The louvres in belvedere are to be of sufficient size and number so that the combined free area of openings will equal not less than 36 square feet.

In the attic space there are two vent flues leading from toilets. These will be connected with an aspiring chamber by means of galvanized-iron pipe of No. 26 gauge. This aspiring chamber will be approximately 2 feet 6 inches square by 6 feet high, and is to be lined with No. 24 black iron, and the top of same to be fitted with galvanized-iron hood that will run through roof to ventilator. These vents from toilet rooms are also to be provided with a quadrant-volume damper.

At the base of the heat flues mixing dampers are to be provided of design approved by the architect so that the mixing of the hot with the tempered air can be easily accomplished.

The control of these mixing dampers is to be by means of a chain with an approved handle at the end of same so that the teacher in each room can control the amount of heat required. An approved dial is to be furnished and installed to indicate the position of the dampers.

From the hot and tempered air ducts there will be made to each verticle flue a hot and tempered air connection. At points where the warm air discharges into the room, a galvanized iron cap is to be placed at top of flue. These caps will be made of No. 26 gauge iron.

Galvanized-iron piping is to be constructed with flat seams and be provided with suitable hangers to support these ducts at frequent intervals, so as to make the work secure.

All bends in piping shall have a minimum radius at the throat equal to the width of the pipe.
VOLUME DAMPERS.—The volume dampers shall be of the butterfly type and be provided with a trunnion and fastening device so that same may be locked in any desired position during the adjustment of the system. These dampers are to be set to give the best distribution of air and must be equal in all respects to those manufactured by Tuttle & Bailey Manufacturing Company.

REGISTERS.—All heat and vent openings into the room in basement will be provided with a plain lattice design register complete with register box and blades. These registers are to be securely fastened to the galvanized-iron ducts.

HEAT AND VENT WIRE GUARDS.—The openings into each room on the first and second floors will be provided with wire guards made of No. 8 brass wire, of $1\frac{1}{4}$ -inch diagonal mesh, and will be of sizes indicated on plan.

They will be provided with a $\frac{1}{4}$ by $1\frac{1}{2}$ inch angle iron frame, and will be of the finish of the room. They are to be made in a neat, workmanlike manner and the guards must be to the entire satisfaction of the architect.

ASPIRING CHAMBER.—In attic space, at point indicated, there will be provided an aspiring chamber of sizes shown on drawing, constructed of wood and lined with black iron. In this aspiring chamber there will be placed near the floor, but above the flue connection to same, two 7 square foot sections of wall radiation laid flat for the purpose of accelerating the flow of air through the vent ducts.

The top of this aspiring chamber will be connected to a 26-inch ventilator placed above the roof, this ventilator to be equal to the "Star."

All joints in ducts leading to aspiring chamber and joints where the ducts connect directly with the chamber are to be air-tight. These ducts will be given an upward grade.

The radiator in this aspiring chamber will be controlled by a hand valve placed in basement. The return end of radiator will be connected to the return riser through a Webster water-seal motor.

PIPE.—All piping, except where otherwise noted, used on this work will be of black wrought iron of standard threads, equal in every respect to that manufactured by A. M. Byers Company, Pittsburg, Pa., or as may be approved by the architect.

All pipe used will be of such weight as will stand the various pressures to which it will be subjected.

All pipe must be thoroughly cleaned of all dirt, scale, etc., before erection.

The sizes shown on drawing are the minimum which will be allowed.

Due provision is to be made for the expansion and contraction of all pipes.

Branch connections will be taken from the top of mains.

All piping will be run in general direction shown on plan, and will be hung from the ceilings unless otherwise noted.

All piping is to grade in direction indicated by arrows not less than 1 inch in 30 feet.

FITTINGS.—Screwed fittings used, unless otherwise noted, will be of heavy, gray iron with heavy bosses and full Briggs standard threads.

Flanged fittings are to be used of standard manufacture.

Flanges or unions are to be used at suitable points to allow for disconnection for repairs, etc.

No malleable-iron fittings will be allowed. All fittings will be of such weight as to stand the various pressures to which they will be subjected.

Dixon's or Wisconsin graphite pipe-joint paste, or equal, is to be used in making screwed joints.

HAND VALVES.—Valves must be placed at all points necessary, whether specifically called for on the plans or in the specifications.

All valves are to be of a type most suitable for the work required of them.

All globe and angle valves are to be equal in every respect to those manufactured by Fairbanks, Jenkins Brothers, or the Pittsburgh Valve Company. Globe valves must not be used on horizontal pipe unless turned on their side.

All gate valves are to be equal to those manufactured by Chapman Manufacturing Company or Ludlow.

Valves under 2 inches in size, except where otherwise noted, will be brass body and iron wheels; valves from $2\frac{1}{2}$ to 4 inches will be iron body, brass mounted, and iron wheels. Valves over 4 inches will have iron bodies and wheels, other parts brass or composition, with outside screw and yoke.

RADIATOR INLET VALVES.—Each direct radiator throughout the building, excepting radiator in aspiring stack, is to be fitted with a hand-control modulation valve at top of radiator which may be opened or closed in proportion to the amount of heat needed or desired. The top of this valve is to be fitted with a dial which will indicate the degree of opening in the valve.

These valves will be brass body, nickel plated all over, with wooden handles and male unions.

They will be $\frac{3}{4}$ inch in size for radiators up to and including 80 square feet and 1 inch in size for radiators above 80 square feet.

These valves are to be equal in every respect to the Webster modulation valve.

DIRT STRAINER.—All drip points and each return connection from tempering and reheater sections of hot-blast apparatus are to be fitted with a dirt strainer, having a brass bracket on the inside for the purpose of collecting scale, sediment, and other foreign substances before passing through the water-seal motors. These dirt strainers are to be equal in every respect to the Webster.

WATER-SEAL MOTOR.—The return end of all radiators is to be fitted with a water-seal motor $\frac{1}{2}$ inch in size. The various hot-blast heater sections and drip points are also to be fitted with one or more water-seal motors on each row of sections.

These water-seal motors shall be so constructed that the water of condensation will drain by gravity to the outlet valve of the motor without the interposition of a check valve or seal of any nature whatsoever between the motor and the apparatus to be drained. There shall be but one movable member in the motor, which shall be nonsinkable.

HANGERS, FLOOR AND CEILING PLATES.—Provide substantial expansion pipe hangers of Hanna ball-joint pattern, or equal, for the support of all piping, same to be spaced in accord with weight and size of pipe to prevent sagging from line of grade, and to be not less than every 12 feet for $1\frac{1}{4}$ -inch pipe, other sizes in proportion.

Where pipes pass through walls, floors, or other partitions, they are to be protected by means of wrought-iron thimbles with nickel-plated floor and ceiling plates, of pattern to be approved by the architect.

Thimbles and plates are to be fastened to pipes in such manner as to prevent same from slipping down.

Tubes that pass through walls or floors are to be of such proportions as to leave an air space around the pipes, and are to be in strict accordance with the rules of the Fire Underwriters.

COVERING.—All supply mains and branches in basement are to be covered with 2-ply asbestos air cell covering. The return main and branches will not be covered.

Fittings are to be covered with plastic asbestos of the same thickness and to have a smooth, hard finish.

Covering is to be fitted with canvas neatly sewed on and fastened in position with brass bands spaced every 3 feet.

The size of the covered mains is to be plainly stenciled on the outside.

Steam and return risers will not be covered.

Smoke breeching and boiler are to be covered with a $1\frac{1}{2}$ -inch thickness of plastic asbestos held in place by poultry wire. A finishing coat $\frac{1}{2}$ inch thick is to be placed on top, which is to be troweled smooth.

PAINTING AND BRONZING.—All exposed ironwork in basement, excepting galvanized, but including pipe and fittings not covered, hangers, boiler fronts, air-separating tank, etc., will be painted one coat of black asphaltum varnish.

All radiators, excepting wall radiators in aspirating chamber and exposed risers throughout the building, are to be given one coat of filler and one coat of bronze, of color to be selected by the architect.

Connection to each flue in attic space is to be lettered to indicate the room it serves.

All painting and bronzing is to be done while the apparatus is warm, so as to give a neat, even finish, and must be done by mechanics familiar with this class of work.

CARPENTER AND MASON WORK.—All necessary carpenter and mason work required for the installation of the heating system, the cutting of holes for the running of mains, and the repairing of same, are to be included under these specifications.

The foundations for heater, fan, motor, and pit for boiler will be furnished under the general building specification. The aspirating chamber, which is to be made of wood and lined with black iron is to be furnished by the heating contractor and made in a neat and workmanlike manner.

SPECIAL DEVICES.—The following special devices are to be furnished hereunder, which must be Warren Webster & Co. manufacture, or other make acceptable to the architect:

The necessary water-seal motors for use on the return end of radiators.

The necessary modulation valves to be used on the supply inlet of radiators mentioned under "Radiator inlet valves."

The necessary water-seal motors for use on the drip points and hot-blast sections.

The necessary dirt strainers for use on drip points and hot-blast sections.

One special vent valve.

One damper regulator.

One return inlet valve.

Under these specifications all materials and labor to properly install these specialties in accordance with these plans and specifications and further instructions as may be given by the manufacturers of the above-mentioned specialties.

TEST.—Upon completion of the work embodied in the various parts of these specifications the following test is to be made:

Boiler, 15 pounds.

Steam-heat piping, both supply and return, 10 pounds.

Cold-water piping, 50 pounds.

Drain piping, 10 pounds.

Cast-iron radiation, 10 pounds.

All test pressures are understood to be so many pounds of steam per square inch, except for the cold-water lines.

After the various portions of the system have been tested and made tight at the pressures stated, a preliminary test will be run on the system of not less than a period of two weeks for the purpose of cleaning out all sediment, rust, scale, or other foreign substances from the pipes.

During the preliminary cleaning out of the system the interiors are to be removed from the several water-seal motors so as to allow free passage.

After the system has been thoroughly washed out, the interiors of the water-seal motors are to be inserted and the condensation delivered to the boiler.

ELECTRIC WORK.

GENERALLY.—The contractor shall furnish and install complete electric installation as outlined on plans and as described herein, including all iron conduiting, rubber insulated wiring, service and main distribution boards, panel board and cabinets, junction boxes, switch, and outlet boxes, etc.

This specification is intended to cover electric-light wiring complete from point where service enters building in basement to main service and distribution board and from there on to each panel board, switch, side and ceiling outlets, etc., as hereinafter specified.

SOURCE OF CURRENT.—The source of current supply for light and power will be the electric service company's wires brought into the building at point noted on the drawings. Current will be 220-110 volt, 3-wire, alternating, 60-cycle, single phase. Contractor must consult with the engineer of the electric service company as to the most practical point to bring service into the building, also verify voltage, cycle, and phase of current.

SYSTEM.—The system of wiring for the electric lighting to be by means of 3-wire, convertible system, 220-110 volt, from the distribution board and farthest panel boards and parallel 100 volts, 2-wire system balanced circuits from the panel boards to the lights.

Power wiring shall be 2-wire, 220-volt from switch on distribution board to speed controller for fan motor.

DROP IN VOLTAGE.—The fall in potential from the lighting service boards to the farthest lights on any circuit from the panel boards shall not exceed 4 per cent when the mains and feeders supplying the lights are fully loaded. The fall in potential in the power service boards to the farthest motor can not exceed 4 per cent with all motors operating at full speed and under full load.

CONDUITS.—Only iron or steel conduiting of standard gas pipe dimensions and thickness of metal shall be used. The interior surface to be free from burrs and sharp points, and must be coated or enameled to prevent oxidation with a substance that will not soften or become sticky. The exterior of conduit to be either enameled, coated, or galvanized.

All conduits shall be run so as to be concealed under or between floors, in walls, partitions, chases, behind furring, etc. No horizontal or cross runs in partitions will be allowed. The vertical risers must be supported at the base with suitable clamps to carry the weight of the risers, and they shall be braced to the walls of the building every 10 feet. Where proper support for fastening can not be otherwise obtained the contractor must provide suitable wooden blocks, which shall be firmly fastened to the floor or other construction, and to which the conduits must be secured. The use of wire nails or other staples for fastening is prohibited, except where conduit is afterwards to be embedded in concrete. The conduits must be continuous from outlet to outlet and from outlet to every junction box, and not more than four quarter-turn elbows or bends are to be used in any run. The conduit must be perfectly water-tight and ends plugged on the completion of the work until the wires are fished in.

Terminals for all feeder and tap tubes, whether at outlet box, junction, or tablet boxes, are to be finished with check nuts and bushings. The bushings are to have rounded edges and be tapped to screw on end of conduit.

Outlet boxes are to be rigidly clamped between check nuts and bushings, and the conduit at outlets to be so supported that the outlet boxes will be securely held in place.

LOCATION OF OUTLETS.—The approximate location of outlets is shown on plans. The architect reserves the right to determine the exact location of same, and no allowance will be made to contractor for any changes in conduit work, wiring, etc., made necessary by his neglect to have all such locations approved by the architect.

SETTING OF OUTLET BOXES.—Unless otherwise specified outlet boxes are to be installed at all outlets shown on plans. They must be set so that their face will be flush with the face of finished plaster line. Side outlet boxes and switches to be held in position by two expansion bolts.

PULL BOXES.—Water-tight steel pull boxes shall be used at the base of vertical feeders or at other points, if necessary, where the architect may direct, to facilitate the drawing in of feeders and tap wires. These boxes must have hinged fronts which, when closed, will make them water-tight.

OUTLET BOXES.—Outlet boxes shall be of pressed steel, enameled inside, and securely fastened in place. They shall be of a pattern approved by the architect. The conduits are to be fastened in these boxes by means of lock nuts and bushings, and all unused outlets or holes in boxes are to be left sealed. Outlet boxes must also afford adequate and suitable means for the support of all electrical sockets and receptacles that may be attached thereto. Side wall outlet boxes to have threads cut in the bottom to act as fixture fastenings. Ceiling cluster outlet boxes to have similar threading stud for fixture fastenings. Boxes for single drop lights to have covers with center holes fitted with insulating bushings of hard rubber.

FEEDERS AND CIRCUITS.—Feeder No. 1 to consist of three No. 6 B. & S. cables, installed in 1½-inch conduit, to start from a 3-pole, 50-ampere switch on distribution boards in janitor's room and run direct to panel board in basement, from basement panel board to first floor panel, and from first floor panel board to second floor panel board. This circuit is for supplying current for circuits for halls and entrance lobby only.

Feeder No. 2 to consist of three No. 6 B. & S. cables, installed in 1½-inch conduit, to start from a 3-pole, 50-ampere switch on distribution board in janitor's room and run direct to panel board in basement. This feeder is for supplying current to all basement light outlets with the exception of hall.

Feeder No. 3 to consist of three No. 6 B. & S. cables, installed in 1½-inch conduit, to start from a 3-pole, 50-ampere switch on distribution board in janitor's room and run direct to panel board in first floor. This feeder is for supplying current to all first floor light outlets with the exception of hall and lobby.

Feeder No. 4 to consist of three No. 6 B. & S. cables, installed in a 1½-inch conduit, to start from a 3-pole, 50-ampere switch on distribution board in janitor's room and run direct to panel board in second floor. This feeder is for supplying current to all second floor outlets with the exception of hall.

Feeder No. 5 to consist of two No. 4 B. & S. cables, installed in 1½-inch conduit, to start from a 2-pole, 25-ampere switch on distribution board in janitor's room and run direct to switch on starting box for motor in fan room.

CIRCUITS.—From basement panel boards run branch circuits of No. 14 B. & S. duplex wire installed in $\frac{5}{8}$ -inch conduit, as follows:

- Circuit No. 1 to hall.
 - Circuit No. 2 to class room A.
 - Circuit No. 3 to class room B.
 - Circuit No. 4 to boys' lavatory
 - Circuit No. 5 to girls' lavatory.
 - Circuit No. 6 to fan room.
 - Circuit No. 7 to boiler and janitor's room.
- From panel board in first floor run branch circuits as heretofore specified, as follows:
- Circuit No. 1 to hall.
 - Circuit No. 2 to class room A.
 - Circuit No. 3 to class room B.
 - Circuit No. 4 to class room C.
 - Circuit No. 5 to class room D.
 - Circuit No. 6 to cloakrooms.
 - Circuit No. 7 to principal's room.

From panel board in second floor run branch circuits as heretofore specified, as follows:

- Circuit No. 1 to hall.
- Circuit No. 2 to class room A.
- Circuit No. 3 to class room B.
- Circuit No. 4 to class room C.
- Circuit No. 5 to class room D.
- Circuit No. 6 to cloakrooms.
- Circuit No. 7 to teachers' room and toilet.
- Circuit No. 8 to library.

All circuit wiring to extend through outlet boxes sufficient length to allow for proper splicing of fixture wires.

MAIN DISTRIBUTION BOARD.—Furnish and install in janitor's room distribution board to be made of polished slate $1\frac{1}{2}$ inch thick, upon which is to be mounted the following:

- One 3-pole 400-ampere F. T. knife switch controlling service feeders.
- Four 3-pole 50-ampere F. T. knife switches controlling feeders Nos. 1, 2, 3, and 4.
- One 2-pole 25-ampere F. T. knife switch controlling feeder No. 5.
- Two 3-pole 25-ampere F. T. knife switches spare switches.

All the above switches to be equal to Krantz or Bossert manufacture; to be draw-file finish.

All bus-bar work to be on rear of board.

The carrying capacity of bars and lugs shall be figured for not more than 800 amperes per square inch of cross section of same, and all contact surfaces must be carefully finished and fitted to come to bearing at every point.

All copper to be of pure forged or rolled metal, milled to proper shape and properly polished and lacquered. Switch handles, crossbars, etc., to be of vulcanized rubber, polished. There shall be an insulation resistance between any two conductors of opposite polarity on the board and between the connections and ground of not less than 1 megohm; provide all necessary fuses and make all necessary connections between circuits at panels. All fuses must be of the inclosed cartridge type, and they must have proper terminals, with the ampere capacity marked on each fuse. This board is further to be provided with two-light brackets of copper finish.

PANEL BOARDS.—This contractor shall furnish and place all the panel boards and cabinets indicated on the drawings at the general locations shown, but only after conference with the architect as to their exact position.

The cabinets are to be constructed of not less than No. 12 gauge sheet iron, with a substantial angle-iron frame and angle-iron corners. To be painted two coats R. I. W. paint and securely fastened in wall or partition. In this box set polished slate panel board $\frac{7}{8}$ inch thick, and around this set a slate frame $\frac{1}{2}$ inch thick, leaving a 4-inch gutter all around between slate and steel box. The box to be provided with lugs for fastening trim.

The holes for the feeder cable and mains shall be of sufficient diameter to allow the free passage of the lugs through them.

The slate board shall be secured to the iron box with adjustable fastenings with brass lock nuts, etc., permitting verticle, horizontal, and lateral adjustment, so that the board can be exactly centered to the finished openings.

The door of cabinet shall consist of plate glass set in a wood frame to match trim of building and provided with flush hinges and substantial snap lock with key. All cabinets to be opened by the same key. The inside of door to be lined with $\frac{3}{8}$ -inch slate and the back of trim over gutters with No. 16 gauge sheet iron, painted.

Tablets and cabinets to be of first-class construction, and detail drawings of same shall be submitted to the architect before the installation begins for approval.

All drilling of slate shall be carefully done, and all holes in the back of the panel to be counterbored and to be filled with an insulating compound that will not melt at a temperature of less than 220° F.

The junction of tubing with panel board cabinets will be made as near the back of the box as possible, and shall have terminal bushings and nuts as specified for outlet boxes.

On each tablet furnish and install feeder and tap connections, bus bars, fuse tips, and studs of required number and capacity.

Each feeder at the entrance to the panel board is to be connected direct to bus bar without fuses, no main switches to be provided for feeders at panel boards.

Switches for the branch circuits are to be double-pole baby knife pattern of sufficient carrying capacity for each circuit.

All connections for panel boards shall be on the front and no live parts shall be exposed on the back. Each contacting part shall be fastened to the base with at least two screws to avoid shifting.

The fuses shall be held in place by means of suitable spring clips securely fastened to the terminals and to the slab itself by means of screws or bolts with hexagonal heads.

All outlets corresponding to spare switches are to be plugged and sealed with wax compound.

Separation of nearest metal parts of opposite polarity shall be of not less than $\frac{3}{4}$ inch for taps and $\frac{1}{4}$ inch for feeders, and minimum break of not less than $\frac{3}{4}$ inch for taps and 1 inch for feeders.

The carrying capacity of bars and lugs shall be figured for not less than 800 amperes per square inch of cross section of same, and all contact surfaces must be carefully finished and fitted to come to bearing at every point.

All switches must have ample metal for stiffness, and to prevent rise in temperature at any time of over 50° F. under full regulated load. The contact surfaces must be fitted for all bearings at every point, and a separation or break distance for switches shall be as specified for fuses.

Each tap switch and circuit it controls must be designated by a number clearly and neatly stamped on the copper crossbar.

A legend sheet shall be mounted on the inner surface of the cabinet door, giving the number of the circuits therein and the rooms they supply.

All copper work is to be of pure forged or rolled metal, milled to proper shape and properly polished and lacquered.

All slate must be of selected quality and free from mineral veins.

Switch handles, crossbars, etc., to be of vulcanized rubber, polished.

There shall be an insulation resistance between any two conductors of opposite polarity on the tablets and between connections and ground of not less than 1 megohm.

Should structural difficulties prevent the execution of the setting of the tablets, running of conduits, etc., at points indicated on plans, the necessary deviation therefrom, as determined or approved by the architect, will be permitted and must be made without additional expense to the Government.

Provide all the necessary fuses and make all the necessary connections between circuits at panels. Provide an extra assortment of fuses equal to 20 per cent of the number required for the panel-board connections for the circuit work specified. All frames must be of the enclosed cartridge type, and they must have copper terminals, with the ampere capacity plainly marked or stamped on each.

DRAWINGS.—Before any of the electrical work is installed the contractor shall furnish to the architect for his approval drawings in triplicate showing all lighting outlets, run and size of all conduits and wiring, and shop drawings of distribution and panel boards.

TESTS OF ELECTRIC LIGHTING.—When the installation work is complete in accordance with the requirements of the specifications and plans and to the satisfaction of the architect, tests shall be made of the entire system by the contractor and under the direction of the architect or his authorized representative. The tests of the electric wiring system shall conform to the following conditions, in accordance with the Underwriters' Code.

The complete lighting installation must have an insulation between all the conductors and ground (not including attachments, sockets, receptacles, etc.) of not less than the following:

	Ohms.
5 amperes.....	4, 000, 000
10 amperes.....	2, 000, 000
25 amperes.....	800, 000
50 amperes.....	400, 000
100 amperes.....	200, 000
200 amperes.....	100, 000
400 amperes.....	25, 000

CARPENTER WORK.

LUMBER.—All framing lumber throughout, unless otherwise specified or noted on drawings, to be of the best quality longleaf southern pine, thoroughly seasoned, free from saps, shakes, large loose knots, and all other defects.

CONVENIENCE FOR WORKMEN.—The contractor is to provide suitable convenience for the use of workmen employed on the building, with proper enclosures; same to be kept clean during the progress of the work and to be removed on completion.

SHEDS.—The contractor is to provide suitable weatherproof sheds for storing cement, cut stone, lumber, etc., as may be required, same to be removed on completion of the work.

CENTERS.—Provide centers for all arches as required. No arches to be turned without centers.

Provide all arch centers required to set brick or cut stone, and set, case, and strike same.

PROTECTION.—Protect with pine and spruce boards, as soon as set, all projecting courses, bases, jambs, sills, or other work liable to injury, and keep same covered until front is cleaned down.

See also "Protection of the work" under "General instructions and conditions."

LINTELS, BLOCKS, ETC.—Provide 2-inch plank lintels to suit the thickness of wall for all brick openings.

Provide wood brick where required for nailing, and blocks for frames, dampers, etc., required for ventilating work.

Provide 5 by 12 inch yellow-pine templates for fan foundations.

BUCKS.—Set 2 inch by thickness of terra cotta rough frames for all openings where fireproof partitions are specified.

GROUND.—Set grounds $\frac{1}{2}$ by 3 inches for plastering around all openings where shown on drawings set straight and plumb.

SLEEPERS.—To be 2 by 3 inch Georgia pine, beveled; set 16 inches on centers for all wood floors throughout.

ROOF SHEATHING.—All roofs to be sheathed with $\frac{7}{8}$ inch thick tongue and grooved short-leaf southern pine sheathing; boards not to be over 6 inches wide, two nails at each bearing, and joints to be well broken.

CEILING JOISTS.—Ceiling joists to be 2 by 8 inches and be framed as indicated by drawing No. 8, and to be anchored to rafters.

Anchor joists every 5 feet to brick work with $\frac{1}{4}$ by 1 inch T anchors.

ROOF RAFTERS.—Roof rafters to be 2 by 12 inches, spaced 20 inches on centers, and to be anchored to ceiling joists. Hip and valley rafters to be doubled up and securely spiked together.

FLOORING.—On drawings Nos. 5, 6, and 7, materials and sizes of wood floors are designated. All flooring to be the best of its kind, free from all sap, shakes, large or loose knots, and all other defects. Where pine flooring is called for it shall be southern yellow pine edge-grain flooring, tongue and grooved, $\frac{7}{8}$ inch thick. Under all flooring in class rooms in first and second floors place one layer each of Florian & Cabot's deadening quilt, or equal. All flooring to be laid close and blind nailed and left perfectly smooth upon completion of the building.

TILE, MARBLE, AND SLATE.

CERAMIC FLOORS.—Provide for teachers' toilet room ceramic floor of 1-inch hexagonal white caustic tile laid on 1 inch bed of Portland cement, with close joints, grouted.

MOSAIC FLOORS.—Provide for main entrance lobby as indicated on drawing No. 6 mosaic flooring, same to be of square cubes of marble, and to have a border, and not to exceed in cost 75 cents per square foot. Contractor will be required to submit to the architect for his approval sample of mosaic floor, showing border and field.

MARBLE.—Provide for water-closet in teachers' toilet marble floor slab 24 by 20 by $1\frac{1}{2}$ inches thick.

SLATE.—Where slate is specified same is to be of first quality, free from all imperfections, and to have rubbed finish. Slate for stair treads to be in accordance with the sizes shown by detail on drawing No. 9; samples of slate to be submitted to the architect for his approval.

LATHING AND PLASTERING.

GENERALLY.—The contractor is to see that all grounds are set straight and plumb and out of wind, and make good any defective grounds.

Should any pipes or conduits project beyond the brown coat same must be cut back.

The contractor is to do all patching and repairing, and at completion leave the work in perfect condition. Cracks to be cut out and pointed up.

WHERE TO PLASTER.—All walls and ceilings throughout the building are to be plastered, with the exception of the ceilings in boiler, fan, and janitor's room.

LATHING.—The only lathing required will be for all walls less than 9 inches thick, shown on the plans, and for ceilings of second floor. This lath to be No. 1 spruce, thoroughly seasoned, securely nailed at all bearings, with joints broken every 16 inches and space $\frac{1}{4}$ inch apart for side walls and $\frac{3}{8}$ inch for ceilings.

ANGLES.—All exposed angles, except reentrant angles, to be rounded with an inch radius. This must be accomplished by hacking the brickwork if necessary.

PLASTER.—All work on laths to be three-coat work. Brick walls will receive a heavy coat of brown mortar and a finish coat. All plastering, except ceilings and blackboard spaces, to be sand-finished work, free from brush marks, one part lime putty and three parts sharp, clean sand, free from clay. All ceilings to be finished in hard white with plaster of Paris and lime putty.

The spaces shown for blackboards to be finished with a white coat set in ground calcined plaster and troweled to a smooth, hard surface, the lime for the above to be slacked at least three weeks before using and to be mixed with fine white sand. This coat must be guaranteed from chip cracks or any defects impairing its usefulness for the purpose intended.

SAND.—Sand for plastering to be clean, sharp, river sand for all but last coat of sand finish, which will be clean, fine, sharp white sand.

LIME.—Lime to be fresh-burned lump lime.

MIXING.—Mortar to set at least two weeks before applying, and mixed in proportions of 2 of sand, adding long cattle hair in proportion of one-half barrel to one barrel of unslacked lime.

Lime paste to be prepared in a box with screen at end, of fine mesh, where paste is to be run off. Water is to be added to rock lime in large quantities and not stirred to aid slacking.

Lime mortar must be protected from frost by being covered up if mixed in weather when freezing is likely to occur, and the plasterer is also to take precaution against freezing with temporary stoves, and keep thermometers in the building, which are never to go below 32° F. until plaster is entirely dry, and is also to inclose the windows with cotton if found necessary to bring about the above results.

MILL WORK.

MATERIAL.—All the stock for the interior finish is to be of the best quality, free from sap, knots, or other imperfections, and is to be thoroughly seasoned and kiln-dried.

All to be smoothed, scraped, and sandpapered before putting up, and at completion to be thoroughly cleaned and left in perfect condition for painting.

No woodwork is to be put into the building, under any condition, until the plaster is thoroughly dry, and it is to be brought directly from the kiln.

All work is to follow strictly the scale and full-size details.

Oak is to be white, free from sap or other imperfections. Southern pine is to be straight-grained, clear heart material, free from large or loose knots.

DOOR FRAMES.—Door frames to be sizes shown, and in strict accordance with the scale detail as shown on drawings Nos. 5, 7, and 10. Exterior door frames for first floor to be of oak; remainder of exterior door frames to be of pine. All interior door frames to be of pine.

DOORS.—All doors to be of the general design shown by scale details on drawings Nos. 2, 3, 5, 7, and 10. Doors for openings Nos. 27, 28, and 145 are to be veneered on staved-up pine cores, veneer to be $\frac{1}{4}$ inch thick oak, well glued and kiln dried. Doors for openings Nos. 29, 33, 119, 123, 126, 219, 223, 226, and 230 to be 3 feet 6 inches wide, 8 feet high, and 1 $\frac{1}{4}$ inches thick, and of design shown on drawing No. 7, constructed of clear southern pine. Doors for openings Nos. 20 to 26, inclusive, Nos. 30, 31, 32, 120, 121, 122, 127, 128, 220, 221, 222, 227, 228, and 229 to be 3 feet wide, 8 feet high, 1 $\frac{1}{4}$ inches thick, and of design shown on drawing No. 7, constructed of clear southern pine. Doors for openings Nos. 45, 48, 104, 108, 137, 138, 204, 208, 236, 239 to be 3 feet wide, 8 feet high, 1 $\frac{1}{4}$ inches thick, and of design shown on drawing No. 7, constructed of clear southern pine.

Doors for teachers' closets Nos. 39, 40, 134, 135, 151, 237, 238, and 246 to be 2 feet 6 inches wide, 8 feet high, 1½ inches thick, and of similar design as shown for other doors constructed of clear southern pine.

Doors for water-closet partitions to be of sizes and design shown on drawing No. 5, constructed of southern pine. **THRESHOLDS.**—All openings to be provided with straight-grained oak thresholds excepting main entry doors, where same are to be of solid brass.

WINDOW FRAMES.—All window frames are to be in strict accordance with general design shown by elevation and scale detail, as shown by drawings Nos. 2, 3, 6, and 10.

Pulley stiles 1½ inches thick; parting strips ½ inch, of yellow pine; other parts of white pine; sills 2 inches, rebated; casing and back lining ¾ inch, molded staff bead.

Calk around all window frames with mineral wool.

WINDOW SASH.—Window sash to be of clear white pine, divided as shown on elevation and scale details as shown on drawing No. 10; to be hung with approved bronze sash chain to cast-iron weights, or lead weights where required.

Stops to be put on with adjustable stop-bead washers and countersunk screws.

All frames and sash are to follow closely the full-size details.

TRANSOM SASH.—Where called for by the drawings, over doors and windows, transom sash to be of the same sizes and materials as the door or window under same. All transom sash to be hinged at the bottom.

TRIM.—All doors and window openings to have a ⅞ by 4 inch trim, with 1¼ by 1½ inch band molding. Trim to be of the same material as that of doors—that is to say, oak for one side and pine for the other, or both oak or pine, as the case may require. Trim to be molded and erected in strict accordance with details shown on drawing No. 6.

Around class rooms, between all doors and windows, the contractor will provide a grooved chalk strip 1½ by 3½ inches, returned at ends with 1½ by 1½ inch molded apron. A ⅞ by 1½ inch molding will be carried around all four sides of blackboard spaces to miter and form at top the bed mold for cap. A cap molding 1¾ by 2¾ inches will be provided across top of blackboard.

BASE SKIRTING.—Base skirting to be constructed in accordance with detail on drawing No. 7, and will be of southern pine, this base to be run in all rooms, halls, etc., except boiler room, janitor's room, fan room, and boys' and girls' lavatories, where there is to be provided cement base.

FLAG POLE.—The contractor must furnish and erect a flag pole of clear spruce 26 feet long, 8 inches at butt, tapered as shown, supported, braced, and cross-braced as shown, making all firm and secure. The pole will be capped with a gilded copper ball 6 inches in diameter and supplied with lignum-vite truck, with sheaves and cleat and with "Sampson," or equal thereto, braided-cord halyards.

STAIRS.—There will be no woodwork in connection with stairs, with the exception of hand rail and newel cap, which are to be quartered white oak; hand rail to be continuous and to have all necessary ramps, goose necks, and easers.

HOOK RAIL.—Provide for all closets where shelving is specified southern-pine hook rail ⅞ by 3 inches, beaded on the edges; similar rail to be provided for the cloakrooms.

CHAIR RAIL.—Provide for all halls, teachers' rooms, and library chair rail of southern pine as shown by detail on drawing No. 7.

SHELVING.—Provide for closets in cloakrooms two rows of shelves 10 inches wide of southern pine.

PARTITIONS FOR WATER-CLOSETS.—The water-closet inclosures of clear, white pine with partitions ⅞ by 3 inch tongued, grooved, and beaded boards. Stiles between doors to be 7 feet high and to rest at bottom in N. P. shoe (Standard Catalogue No. 675-S). The shoe or standard to be securely fastened into concrete and be placed at front and rear of partitions, the stiles to be 6 by 1½ inches and cut to fit in shoe and rounded off on top.

EXPOSED RAFTERS.—Exposed rafters, cross-brackets, and brackets and exposed sheathing to be built of long-leaf southern pine, and to be in strict accordance with scale detail as shown upon drawing No. 10. All material for exposed work to be dressed on all sides.

WORKMANSHIP.—At the completion of the joiner work all doors are to be in perfect working order, and all sash adjusted so as to work free and without unnecessary play.

Contractor is to furnish everything necessary to complete the joiner work, including all nails, screws, sandpaper, etc., to the entire satisfaction of the architect.

Contractor may, if he so desires, submit to the architect for his approval, full-size details of the millwork. If he does not care to avail himself of this privilege, the architect will furnish full-size details by which the contractor must be governed in executing the interior finish.

HARDWARE.

GENERALLY.—The hardware specified is that of P. & F. Corbin's manufacture, and is referred to as the quality of hardware that will be required for the work. Other hardware may be used if equal to that specified, samples of same having first been submitted to the architect for his approval. The schedule of hardware specified covers only the finishing hardware. Contractor will be required to furnish all the necessary sash chain, sash weights, nails, screws, and other hardware of a constructive nature necessary to complete the work.

SCHEDULE OF HARDWARE.—Three pairs main entrance doors:

One pair of Bommer hinges No. 139, to each leaf.

Push plates No. 02325, 4 by 16 inches, two to each leaf.

Bolts No. 2859, top and bottom suitable length.

Dead lock No. 133 $\frac{1}{4}$.

Door holders No. 2860.

Door No. 7:

Lock No. 535-854.

Butts No. 61 $\frac{1}{2}$, 5 by 5 inches, three to each leaf.

Bolts No. 2859, top and bottom suitable lengths.

Doors Nos. 20 and 26:

One pair Bommer hinges No. 139.

Push plates No. 02325 $\frac{3}{4}$, 3 by 12 inches.

All other doors to be provided with lock set No. 275-292 and one and one-half pairs hinges No. 241 $\frac{1}{2}$, 4 $\frac{1}{2}$ by 4 $\frac{1}{2}$ inches.

Doors for water-closet partitions to be provided with one pair of Bommer hinges No. 1000 with reverse spring hinge, and latch No. 595 $\frac{1}{2}$.

DOUBLE HUNG WINDOWS.—All double hung sash to be provided with No. 2 Monarch sash chain and provided with proper sash weights. Sash lock to be No. 1830. Lower door sash to be provided with two sash lifts No. 2215. Sash pulleys to be No. 604 $\frac{1}{2}$ R, with 2 $\frac{1}{4}$ inch diameter wheels. All upper sash to be provided with sash socket No. 2186 $\frac{1}{4}$. Also provide eight sash hooks and poles No. 2286 $\frac{1}{4}$.

CASEMENT WINDOWS.—Casement window sash are to be provided with hinges No. 61, 4 by 4 inches, one and one-half pairs to each leaf, and to have fastener No. 022162.

Provide sufficient number of door stops of hard wood, rubber tipped.

Furnish three master keys for cylinder locks. Furnish six master keys for other locks.

PAINTING.

GENERALLY.—Care should be taken that all wood is thoroughly dry before applying finishing material.

All finger marks, dirt, grease, or other objectionable matter must be carefully removed before commencing to fill or varnish.

In painting new work all knots, sap, etc., are to be covered with pure grain-alcohol shellac before applying priming coat.

All nail holes, cracks, etc., are to be filled with putty after the priming coat. In varnishing use same color putty as the wood after the coat of filler.

No painting or varnishing of outside work will be allowed in wet or freezing weather, nor of inside work unless the building be properly heated to at least 65° F.

All paint to be well brushed out and all varnish, etc., to be applied in a workmanlike manner and as furnished by the manufacturer, without any thinning or addition whatsoever, except as specially noted.

Sufficient time must be allowed between coats for the preceding coat to become thoroughly dry before applying succeeding coat.

MATERIALS.—All materials must be delivered to the building in the manufacturer's original package for inspection by the architect.

All paint is to be pure white lead, equal to the standard as made by the Eagle White Lead Company, of Cincinnati, Ohio, and pure linseed oil equal to the standard as made by the American Linseed Company. All fillers, colors, and stains are to be Devoe & Reynolds Company's or Valentine & Co.'s.

All varnish is to be Standard Varnish Works' or Berry Brothers' hard oil finish.

Samples of all painting, staining, varnishing, etc., are to be submitted to the architect for approval whenever asked for, and all work is to conform strictly to the sample approved.

STEEL AND IRON.—At the shop, before painting, all surfaces must be thoroughly cleaned of loose scale, dirt, or moisture. Then before assembling, to be painted one coat of Dixon's silica-graphite paint, dark red.

After erection, places damaged by abrasion or not previously painted, are to be retouched with same dark red. Then to be painted second coat of same paint, natural color, and to be inspected before masonry is started.

The paint to be furnished at the shop or site in original packages, ready mixed for use, without thinners or oils, and subject to inspections.

METAL WORK.—All ornamental ironwork, exterior and interior, is to have two additional coats Dixon's silica graphite, black.

The galvanized-iron work is first to be sponged with benzine, and then to have three coats of Dixon's silica-graphite, dark red, natural, and last coat of a color selected by the architect.

Tin work to have two coats of Dixon's silica graphite.

All galvanized or black iron, plumbing, heating, and other pipes which are exposed, except polished work and canvas-covered work, are to be given a heavy coat of red lead and oil, and then a good, thick coat of bronze powder mixed with bronze liquid in the regular way.

All canvas-covered work is to be painted two coats asbestos fireproof paint.

Ornamental iron of stairs is to be painted as specified for other ornamental iron, then given two additional coats of paint to bring the same to a mottled Verde antique dull finish to the satisfaction of the architect.

WOODWORK.—At the shop all the woodwork to have a priming coat of paint on the back before leaving the shop, made of 75 pounds of eagle red lead to 5 gallons pure boiled linseed oil, well brushed in. Pulley stiles of frames to be oiled.

All woodwork is to receive the first coat of filler or priming at the shop before exposure to moisture.

Exterior woodwork, window frames, casing, sash, and door frames are to be painted three coats, colored as directed, in addition to the priming of lead and oil. Pulley stiles and parting strips are to be cleaned, oiled, and shellaced.

Oak where specified to receive, first, one coat of dark paste filler, and stain, as per sample approved; second and third, two coats hard oil finish; rub first coat of varnish with curled hair or moss; and, fourth, one coat of Standard Varnish Works' "Flatline."

Where southern pine is specified, same is to receive, first, one coat Pratt & Lambert's oak oil stain, as per sample approved; then one coat of light liquid wood filler; and then two coats Pratt & Lambert's No. 38 Preservative Varnish, rubbed to a dull finish.

BLACKBOARDS.—Blackboards to have three coats of silica paint, rubbed down between coats and on last coat, and finished perfectly smooth, free from brush marks or defects.

GLASS.—All glass throughout, unless otherwise specified or shown on drawings, to be of double thick, AA, American, free from all waves, bubbles, and defects, securely held in place with tacks and putty. Glass for main entrance doors and transom to be of the best quality plate glass of American manufacture, $\frac{1}{4}$ inch thick and free from all defects.

FINALLY.

GRADING.—Contractor will construct terrace as shown on grade sheet, drawing No. 1, the fill for terrace to be made as soon as possible, so the same will have ample time for settlement and shrinkage. Upon completion of the building, contractor will grade off terrace to the levels given, topping off same with 2 inches of rich loam. After loam has been rolled, same is to be covered with a good quality sod, free from rank grass and other objectionable growth, and thoroughly tamped in place.

Top off balance of lot with 2 inches of rich loam, sowing grass seed and rolling same.

APPROACHES.—When directed by the architect, contractor will construct the four approaches as indicated on drawing No. 1. Concrete for the approaches to be the same as hereinbefore specified for other concrete work. The dressing to be the same as specified for cement floors. Platforms and walks will be blocked off into sections approximately 5 feet square.

Driveway to be blocked off into sections approximately 9 inches square.

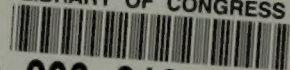
DAMAGE AND CLEANING UP.—Contractor will be held responsible for and required to make good, at his own expense, all damage caused in the execution of his contract; and upon the completion of same will be required to clean up and remove all resulting dirt, debris, etc., from the premises.



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